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# Delineation of Natural Communities, a Checklist of Vascular Plants, and New Locations for Rare Plants at the Savanna Army Depot, Carroll and Jo Daviess Counties, Illinois

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# SUMMARY


## SCOPE OF WORK

The primary purpose of this study was to develop a comprehensive inventory and map of the natural communities at the Savanna Army Depot based on field surveys conducted during 1996 and searches for listed species in previously unsurveyed areas. Emphasis is on Grade C or better sand communities that include sand prairies, sand savannas, and upland forests. The accompanying report provides descriptions, natural quality ratings, and acreages of each natural community. In addition, we 1) gathered quantitative data in selected natural communities and 2) developed an annotated list of vascular plants, with each species vouchered by herbarium specimens. We were also able to accommodate requests for additional information, such as a list of "sensitive areas," an interim report on endangered and threatened species, and a survey for E&T species at a potential prison site.

## NATURAL COMMUNITIES

The following natural communities occur at the Savanna Army Depot, with acreages given for each by natural quality rating (C, D, or E). Particularly significant are the large amounts of sand prairie, sand savanna, the dry sand forest along the river dunes. Long-term grazing by cattle has caused serious degradation to the vegetation of many areas, as has the suppression of fire. However, sand communities are resilient and the recovery potential for numerous areas is high.

Summary of Natural Communities with Areas in Acres (see Table 8)

| | |
|---|---|
| Sand Prairie | |
| Dry | |
| C - | 143.3 |
| Dry-mesic | |
| C - | 4,420.7 |
| D - | 1,282.2 |
| E - | 39.2 |
| Sand Blowout | 3.7 |
| Total Sand Prairie | 5,847.9 |
| Sand Savanna | |
| Dry | |
| C - | 85.6 |
| Dry-mesic | |
| C - | 283.7 |
| D - | 50.3 |
| Total Sand Savanna | 419.6 |
| Sand Forest | |
| Dry | |
| C - | 215.1 |
| D - | 83.6 |
| Dry-mesic | |
| C - | 107.9 |
| D - | 552.6 |
| Total Sand Forest | 959.2 |
| Floodplain Forest | |
| Wet and wet-mesic | |
| C - | 5,564.7 |
| D - | 131.0 |
| Mesic | |
| C - | 16.3 |
| Total F.P. Forest | 5,712.0 |
| Open Water and Pond | 970.5 |
| Cultural | 459.5 |
| Total acres | 14,368.7 |
| Grade C = | 10,796.1 |
| Grade D = | 2,099.7 |
| Grade E = | 498.7 |
| Unrated | 974.2 |

## ENDANGERED, THREATENED, AND RARE PLANT SPECIES

Searches for E&T plants were concentrated in the southeastern third of the Depot, mostly outside the Restricted Area that had previously not been surveyed. However, many E&Twere located throughout the Depot. During 1996 we located extant populations of the following officially listed plants: *Agropyron subsecundum* (bearded wheat grass), *Besseya bullii* (kittentails), *Carex tonsa* (shaved sedge), *Ceanothus herbaceus* (redroot), *Cyperus grayioides*, (Gray's umbrella sedge), *Equisetum pratense* (meadow horsetail) - new to the Depot, *Hudsonia tomentosa* (false heather), *Mirabilis hirsuta* (hairy umbrella wort), *Opuntia fragilis* (fragile

prickly pear), *Polanisia jamesii* (James' clammyweed), and *Salvia azurea* subsp. *pitcheri* (blue sage). While not listed as endangered or threatened, *Talinum rugospermum* (fameflower) is nonetheless rare throughout its range, which is centered in Illinois, and it was formerly a Category 2 Federal Candidate Species. Pepoon collected *Bouteloua gracilis* (blue grama grass) at what is now the Depot in 1908, but it had not been seen since that time. We located one small colony of this species in 1996, which is the only extant population known in Illinois; it will likely qualify for listing as a State Endangered Species when this list is revised.

VASCULAR PLANTS

A total of 617 taxa (species, subspecies, varieties, and forms) were found during 1996. These represent eight families of ferns and fern allies, two families of gymnosperms, 18 families of monocots, and 74 families of dicots. We discovered three taxa of flowering plants that had not previously been reported for Illinois, all of them annuals: *Veronica dillenii* (Scrophulariaceae) is a native of Eurasia, *Arabis* × *divaricarpa* (Brassicaceae) ranges broadly across northern North America, and *Draba nemorosa* (Brassicaceae) is widespread in the New World. In addition, we discovered a foliose lichen, *Xanthoparmelia vagans,* that was new to Illinois.

# INTRODUCTION

In 1917, at the height of World War I, the United States Army was searching for remote, sparsely populated sites to test and store munitions. A huge expanse of sand near the Mississippi River in northwestern Illinois (Carroll and Jo Daviess counties) fit the bill and the Savanna Army Depot was established. Prior to the Army's occupation, this area, known locally as "The Prairie," was studied and observed by Dr. Henry Allan Gleason in 1908. Now, 80 years later, the Depot is being decommissioned. The Illinois Department of Natural Resources, together with various federal agencies, is gathering data to help plan the Depot's future. A team of botanists from the Illinois Natural History Survey's Center for Biodiversity is responsible for evaluating the natural communities and surveying the plants that exist at the Depot.

The Army probably did not recognize the tremendous biological significance of the Depot when it was established, but its extensive sands are very unusual in Illinois. Previous DNR-sponsored surveys of the Depot had located 11 threatened or endangered plant species. With increased access to the base, we discovered one additional state endangered species and many previously unknown populations of the others. We also found at least one plant previously unknown from Illinois that should be a candidate for threatened or endangered status.

Many of the Depot's rare plants are western species that reach their eastern limits on sandy habitats in western Illinois. Two of these, *Mirabilis hirsuta* (hairy umbrella wort) and *Opuntia fragilis* (fragile prickly pear), are known in Illinois only in Jo Daviess County, and the latter is known only from the Savanna Army Depot. Others, like *Polanisia jamesii* (James' clammyweed) and *Carex tonsa* (shaved sedge) have their largest Illinois populations on the Depot. Some of the Depot's animals show a similar pattern. For example, the only population of *Lepus townsendii* (white-tailed jackrabbits) in Illinois was on the Depot. Unfortunately, the jackrabbits disappeared in recent years, probably due to habitat changes and increased numbers of coyotes.

Perhaps even more significant than the individual plant species are the Depot's natural communities. Most noteworthy are its extensive prairies, savannas, and river dune forest. The savanna habitat, which consists of trees, typically oaks, scattered through a grassland, has almost disappeared from North America. Only about 6,400 acres (2,591 hectares) of tallgrass savanna remain in the United States, about 0.02 % of the presettlement total. Prairies have seen similar losses. The Depot, with about 4,500 acres (1,822 hectares) of savanna and prairie, has the most extensive remaining stands of these communities in the state.

The natural communities of the Depot are not pristine, however. For obvious reasons, the Army has vigorously suppressed fires, which are vital for preserving both prairie and savanna from encroaching forests. Cattle have been used to reduce grassy vegetation and therefore reduce fire intensity. Though the cattle probably have slowed forest encroachment, they have also modified the grassland and forest vegetation. We have been uniquely able to document changes in the Depot's vegetation because not long before the Army acquired the land, noted ecologist Henry Allan Gleason, then at the Natural History Survey, published a paper describing the vegetation of the major sand deposits in Illinois, including the region that became the Depot. Overall, we observed that forest cover of the depot has increased, particular in areas that formerly were savanna. In addition, the abundance of some shrubs and grasses has increased, whereas other late successional grasses and forbs that are probably dependent on periodic fires have decreased in abundance.

Still, much of the Savanna Army Depot remains in vegetation that with proper management could recover significantly. Nowhere else in Illinois can one look across a landscape so extensively covered with prairie and savanna. As decisions are being made for the Depot's future, our research provides useful information will help preserve this remarkable remnant of our state's natural heritage.

## OBJECTIVES

This project was conducted under a contract with the Illinois Department of Natural Resources with funding through the Illinois Wildlife Preservation Fund. The primary purpose was to develop a comprehensive inventory and map of the natural communities, using INAI criteria, at the Savanna Army Depot. The map is based on field surveys. Accompanying the map we provide a description for each plant community that includes species composition and dominant species, natural quality evaluation, and acreage. Special reference is given to especially significant or sensitive natural areas, and the emphasis is on Grade C or better sand prairies, sand savannas, and upland forests. The field work concentrated on these same three habitats, with only modest effort expended on the floodplain forests, emergent wetlands, and other areas immediately adjacent to the Mississippi River. These areas were mapped earlier by the long-term monitoring team of the National Biological Service. Plant communities were mapped on 7.5 minute topographic maps, with 5 acres (2 hectares) being the minimum size of an area to be mapped. In addition, we 1) conducted searches for populations of endangered and threatened species of plants in upland forests and other areas that had not been thoroughly searched previously, 2) gathered quantitative data in selected natural communities, and 3) developed an annotated list of vascular plants that occur at the Depot, with each species vouchered by herbarium specimens. During the course of the project, we were also able to accommodate requests for additional information; see the section below on "Additional Studies."

## MATERIALS AND METHODS

### FIELD WORK

This project required extensive field work at the Depot. A total of 13 trips were taken, each trip usually lasting for 3 days, with 2–5 people present on each trip (Appendix 1). During this field work we visited all major habitat types located on the terrace sand area at all growing seasons from mid-spring to late fall. We also visited the habitat mapped by the National Biological Service as floodplain forest. Plant species occurrences were noted at many different localities representing different natural communities and different natural quality grades. Special searches were made for new locations of endangered and threatened plant species in selected areas. Herbarium specimens were collected to voucher the occurrence of nearly all vascular plant species that we observed at the Depot. Quantitative sampling of the vegetation was also conducted (see below). The emphasis of this study was on the terrace sand area as the National Biological Service had previously mapped the bottomland wetlands. However we did follow-up surveys for the composition of natural communities in the extensive floodplain forest along the Mississippi River and along the entire length of the Apple River on the southeastern border of the Depot.

### SAMPLING

**Prairie and Savanna.** The point intercept method of sampling (Mueller-Dombois and Ellenbert 1974) was used for herbaceous vegetation with linear transects, 20 m (65.6 ft) long, sampled at 5 m (16.4 ft) intervals, for a total of five stations per transect. At each sampling station, a 1 m (3.3 ft) point-frequency frame was placed perpendicular to the transect line. Along this frame at 10 cm intervals were 10 vertical metal rods. The number of plants of each plant species that touched each rod were recorded at every sampling station, yielding a measure of abundance of each species at each station. The abundance for each species species in a transect is the sum of the species' abundance at the five stations. Four to 16 transects were run at each site. Since no Grade A or B areas were located in the Depot, the sampling methods of the Illinois Natural Areas Inventory were not used.

**Forest.** Quadrats with horizontal area of 625 $m^2$ (6708 $ft^2$)were used. Initially, square plots were used, but circular plots were used for later samples. All trees 5.0 cm or larger in diameter at breast height (DBH) were recorded.

## Multivariate Analysis

**Prairie and Savanna Data.** For each site, mean abundances were calculated for each species by averaging the abundances in the individual transects. Some species were combined because of difficulties in distinguishing them. Most notable are *Poa compressa* and *P. pratensis* and the species of *Lepidium.* In addition, several plants were recorded on the data sheets were unidentifiable. A total of 110 taxa were recorded at the 11 sites, but only 39 species occurred at four or more sites. Relative abundances of these 39 species, together with relative abundance of bare ground, were used for principal component analysis (PCA). Systat for Windows, version 5 (Systat 1992) was used for this analysis.

**Forest Data.** Relative density and relative basal area (calculated from DBH) were combined to yield importance values (IV200). These values were used for PCA.

## Aerial Photography

To help with delimitation of natural communities and to gain some insight into changes that have occurred over time, we examined the following aerial photographs that included the Depot:

| | |
|---|---|
| 1995 | infrared, 10" contact prints (National Biological Service) |
| 1988 | infrared, 10" contact prints |
| 1988 | black and white, 2' square |
| 1970 | black and white, 10" contact prints (University of Illinois Library) |
| 1955 | black and white, 10" contact prints (University of Illinois Library) |
| 1946 | black and white, 10" contact prints (University of Illinois Library). |

## Natural Community Classification

In delimiting the different types of natural communities that occur within the Depot we use the classification system adopted by the Illinois Natural Areas Inventory (White 1978). For the grading of natural quality, we follow Appendix 22 of White (1978) and White (1981). Because the Depot is such a large area, we only mapped natural communities that were larger than five acres; areas smaller than 5 acres (2 hectares) were included within the surrounding community. No "A" or "B" quality natural areas were identified.

## Calculation of Areas for Natural Communities

We first drew outlines of the natural communites on the base topographic map (scale = 1:24,000) that was supplied to us as part of the contract. In drawing these outlines, we consulted original 7.5' topographic maps and aerial photographs. Because the resulting map showing the outlines of natural communities was visually confusing, the outlines were digitized on a large digitizing tablet. The final map of natural communities, Map 1, was generated using the Geographic Information System on a Sun Workstation at the Illinois Natural History Survey. The overall alignment of the natural community areas are shifted slightly southward relative to roads and other features on the digitized base map. This is because the 1:24,000 base map supplied to us was pieced together from several different 7.5' topographic maps and there were no good registration marks.

To calculate the areas of each natural community, the outlines of each unit (polygons) shown on Map 1 were digitized using a Geographic Information System implemented on a Sun Workstation. The GIS software then calculated the acreage of each polygon. There are inclusions of small size (generally less than 5 acres, 2 hectares) representing other natural communities within many of the polygons. The area of roads, munitions bunkers, and magazines that fall within the boundaries of each polygon were also included, as there was no practical method of eliminating them at the scale used. The open water of sloughs and lakes within the large tract of floodplain forest along the Mississippi River was

also included in the calculations. We did not calculate area for some of the former factory sites in the southeastern part of the Depot as this was considered unnecessary by Randy Nÿboer.

## NATURAL COMMUNITIES

### INTRODUCTION

The Savanna Army Depot lies wholly within the expanded floodplain of the Mississippi River, and the entire western border of the Depot lies along this River. Most of the eastern limits are just inside the tracks of the Burlington Northern railroad. The upland terraces are in the Mississippi River Section of the Illinois River and Mississippi River Sand Areas Division of Schwegman (1973), while the floodplain forest and backwaters are in the Mississippi River Section of the Upper Mississippi River and Illinois River Bottomlands Division. We are most fortunate in that there are several significant published papers that document the landscape and natural communities as they appeared about 1908, before the land was acquired by the Army in 1917 (Gleason 1909, 1910; Pepoon 1910), and these have aided in providing baseline information on natural community composition. Two other papers (Hart and Gleason 1907, Vestal 1913) investigated the sand prairies of other regions of Illinois, and a comparison of five of these publications shows the unique features of the sand communites at the Depot compared to other parts of Illinois.

The Depot consists of two large units. The first is a large sand terrace that is more than 11 miles (17.7 kilometers) long and up to 1.7 miles (2.7 kilometers) wide with a northwest to southeast orientation. This terrace has gently undulating topography that is 20 to 70 feet (6.1 to 21.4 meters) higher than the nominal river level, which is about 590 feet (180 meters) above sea level. This extensive sand terrace, called a "second bottom" by Gleason (1910), is a unique ecological feature today in Illinois, and it supports one of the largest remaining areas of sand prairie in the state. The only comparably large area of sand prairie is at Illinois Beach State Park, adjacent to Lake Michigan. However, this area has very different natural communities. Gleason (1910) described a somewhat similar sand terrace prairie around Oquawka in Henderson County and Havana in Mason County, but extensive row crop agriculture has reduced the occurrence of sand prairie in these areas to only very small remnants.

The second large unit is the extensive floodplain forest that borders the Mississippi River. In the modern floodplain of the Mississippi River, especially south of the levee for Lock and Dam No. 12, this floodplain forest is well developed. There is also floodplain forest at the southeastern-most part of the Depot along the Apple River and at the confluence of this river with the Mississippi. Other floodplain forest, today of poor natural quality, extends across a "neck" of the inland part of the depot just south of the creek that flows out of Beaty Hollow, near Blanding, and then southeastward along part of the eastern limit of the Depot property.

The majority of the second terrace area at the Depot is in the original vegetation cover, mostly sand prairie and sand savanna, with some sand forest. The central core of this terrace area is dissected by about 50 east/west roads that are 1/10 mile (0.06 kilometer) apart, connecting roads the length of the Depot, and a rather extensive railroad system. Dotting the landscape are more than 120 above ground brick munitions magazines and nearly 500 bunkers. The vegetation was obviously impacted by the construction of these facilities. However, most of the construction occurred early in the history of the Depot, and the sand vegetation, being rather resilient as long as there is a nearby source for seeds, has generally recovered from this construction. The sand plant communities are fire-adapted and would have experienced frequent natural fires. Since munitions storage and wild fires are incompatible, grazing by cattle has long been used to keep the vegetation from reaching the stage where it could readily burn. As discussed in more detail below, this grazing has greatly altered the natural communities at the Depot.

Following the classification scheme used by the Illinois Natural Areas Inventory (White 1978), the following natural communities occur at the Savanna Army Depot.

| | | |
|---|---|---|
| Sand Prairie | Sand Forest | Wetland |
| Dry | Dry | Marsh |
| Dry-mesic | Dry-mesic | Lake/Pond |
| Sand Savanna | Floodplain Forest | Pond |
| Dry | Wet | Stream |
| Dry-mesic | Wet-mesic | Major River |
| | Mesic | Medium Gradient Creek |

Determining the present day limits and quality of the first three major community types — sand prairie, sand savanna, and sand forest — have been complicated by several factors. Within the Depot is a continuum of succession: open sand blowouts → stable bunchgrass sand prairie → sand prairie → sand prairie with scattered young black oaks → sand prairie with rather dense young black oaks → young savanna with a canopy of black oaks and an understory of prairie plants → mature sand savanna → sand savanna with early forest species → thicket/forest → sand forest (Gleason 1910). On a broader scale, this is called the "Prairie–Forest Continuum" by plant ecologists and as used by Packard and Mutel (1997). The natural community found at a particular site at a particular time in these sand areas is dependent on topographic relief, available soil moisture, and successional stage following natural or man-induced disturbance regimes. More than any other natural community in Illinois, sand communities are susceptible to rapid changes in plant community structure caused by changes in those factors. Sand communities also have high recovery potential from past disturbances.

Sand prairie, sand savanna, and sand forest are fire-adapted communities, but fires have been suppressed at the SAD for the past 80 years as landscape-scale fires are incompatible with munitions storage. This has favored succession from prairie to savanna and then to forest. Examination of aerial photographs from 1995, 1988, 1970, 1955, and 1946 shows a substantial increase in tree density and cover, which has increased the area of sand savanna and sand forest. In some cases, especially towards the northwestern end of the Depot, second growth dry-mesic sand forest has developed on formerly cleared and cultivated land. In other types of prairies, evidence shows that the long-term lack of fire can lead to a loss of species within a community (Collins 1987, Collins and Gibson 1990, Steinauer and Collins 1996). It is difficult to tell if this has occurred at the Depot; only a few plant species seem to have disappeared between 1908 and the present, and other factors, especially grazing, can also lead to the loss of species. However, it is clear that the reintroduction of fire would also have dramatic impact on the delineation and quality of the natural communities at the Depot over the long term.

Free-range cattle grazing has been used at the Depot for many years to keep vegetation fuel loads low as a means of preventing wildfires (Bowles 1993, Bowles and Jones 1995). As shown by Bowles (1993), this grazing has disrupted the natural disturbance regime and has altered the species composition at the Depot compared to what was observed by Gleason (1910). Even Gleason noted that bunch-grasses seem poorly adapted to heavy grazing by cattle and are soon replaced by *Poa pratensis* (Kentucky bluegrass). Since 1908, there has been a loss of conservative late-successional species and corresponding increases in the abundances of early and mid-successional species. Especially noteworthy are decreases of perennial species, increases of annual and biennial species, and an increase of non-native species. Grazing by cattle also causes a shift towards the dry end of the mesic to dry continuum. Sandy soil does not have much water-holding capacity, and grazing reduces this even further. Grazing also reduces the amount vegetation ground cover, which allows higher intensities of sunlight and wind to reach the ground, both of which increase evaporation (Anderson 1982, Brotherson and Landers 1978, Drew 1947, Herbel and Anderson 1959, Kucera 1956, Nÿboer 1981). Especially notable is the shift from dry-mesic sand prairie to dry sand prairie that can be seen by comparing Gleason's 1908 data (1910) with our sampling data collected in 1996 and with the data

in Bowles (1993) and Bowles and Jones (1995). Brown and Brown (1996) noted that disturbance patterns appear to be the factor affecting the local distribution of *Andropogon gerardii* (big bluestem) and *Schizachyrium scoparium* (little bluestem) in the landscape, although this is sometimes masked by similar patterns in the available-water capacity of soils.

The grading system that delineates the natural quality of natural communities provides terms for describing the relative amount of successional instability or change in a community's natural diversity, species composition, and structure due to disturbances. Basic guidelines are given by White (1978, 1981), which are repeated below.

**Grade A** — Ideally, a Grade A community has a structure and composition that has reached stability and does not show the effects of disturbance by humans. This grade includes a range of conditions: the community may be gradually changing or it may have been lightly disturbed.

**Grade B** — A Grade B community is a former Grade A community that either (1) has recently been lightly disturbed or (2) has been moderately to heavily disturbed in the past but has recovered significantly. If the community was recently disturbed, it was not disturbed so heavily that the original structure and composition were destroyed. If the community was disturbed in the past, it has reverted so that it is reaching stability and no longer is rapidly changing. It can also be a late successional community that is recovering from natural disturbances.

**Grade C** — A Grade C community either (1) has been moderately to heavily disturbed (and may or may not be reverting) or (2) has been severely disturbed and has reverted significantly. The disturbance to a Grade C community has been so great that the original structure has been destroyed, and often the composition has been changed significantly. This grade includes a broad range of degrees of disturbance and of recovery.

**Grade D** — A Grade D community either (1) has been severely disturbed and has not recovered significantly or (2) has been very severely disturbed but has begun to recover. A Grade D community has been so heavily disturbed that its structure (and usually its composition) has been severely altered and is rapidly undergoing succession. (If the disturbance is constant, such as with continual grazing, the community may be stable and may not be succeeding).

**Grade E** — A Grade E community has been so severely disturbed that the original community has been removed, and either (1) the site is going through the first stages of secondary succession or (2) the natural biota is nearly gone. A Grade E community has very few or no higher plants or animals of the original community, and the land surface is often altered.

In our interpretation of grading, the most important consideration is the vegetation that is present at the time the community is examined and sampled. From this one can make inferences about past community structure and future recovery potential, but these inferences must be used cautiously. As discussed above, essentially all natural communities at the Depot have been impacted by man-induced disturbances — fire suppression, introduction of intensive cattle grazing, selective logging, and construction of roads, bunkers, magazines, and other structures. Thus, by definition, there are no Grade A natural communities at the Depot. The same basically applies to Grade B natural communities. The only possible exceptions are the recently erected large cattle exclosure units. From our extensive field work conducted in 1996, we conclude that a very large part of the Depot consists of Grade C natural communities, with some Grade D and E areas also present. Grade C is a very broad category and encompasses various levels of disturbance intensities and stages of recovery. In our

quality ratings of Grade C areas, we use an asterisk (*) to indicate areas that have been disturbed but that seem to have good recovery potential, while a dagger (†) is used to denote areas that seem to have lower recovery potential.

During the 1996 field season, our ability to distinguish, delimit, and grade some natural communities was greatly limited by very heavy grazing by cattle. Of course, the heavy grazing itself is part of the grading criteria, but the grazing was so extensive that we could not always determine plant species presence and abundance at critical times of the year. If grazing is decreased then future studies of natural communities at the Depot are likely to find quite different boundary lines and natural quality gradings, as shown already by Bowles (1993).

## Land Cover Areas of Natural Communities

The areas of each natural community found at the Savanna Army Depot are given below in acres.

### Summary of Natural Communities with Areas in Acres (see Table 8)

| | |
|---|---|
| Sand Prairie | |
| Dry | |
| C – | 143.3 |
| Dry-mesic | |
| C – | 4,420.7 |
| D – | 1,282.2 |
| E – | 39.2 |
| Sand Blowout | 3.7 |
| Total Sand Prairie | 5,847.9 |
| Sand Savanna | |
| Dry | |
| C – | 85.6 |
| Dry-mesic | |
| C – | 283.7 |
| D – | 50.3 |
| Total Sand Savanna | 419.6 |
| Sand Forest | |
| Dry | |
| C – | 215.1 |
| D – | 83.6 |
| Dry-mesic | |
| C – | 107.9 |
| D – | 552.6 |
| Total Sand Forest | 959.2 |
| Floodplain Forest | |
| Wet and wet-mesic | |
| C – | 5,564.7 |
| D – | 131.0 |
| Mesic | |
| C – | 16.3 |
| Total F.P. Forest | 5,712.0 |
| Open Water and Pond | 970.5 |
| Cultural | 459.5 |
| Total acres | 14,368.7 |
| Grade C = | 10,796.1 |
| Grade D = | 2,099.7 |
| Grade E = | 498.7 |
| Unrated | 974.2 |

In the table below, the current acreages of sand and floodplain communities at the Depot are compared with data from the original Illinois Natural Areas Inventory (Table 6 in White 1978) and with 1997 data in the Natural Heritage database set that is at the Illinois Natural History Survey.

## LANDCOVER OF NATURAL COMMUNITIES AT THE SAVANNA ARMY DEPOT

1978 data from the original Natural Areas Inventory; 1997 data from the Natural Heritage Database (which did **not** include the Savanna Army Depot); SAD data generated during this project.

DRY SAND PRAIRIE

| **1978** | | **1997** | | | **SAD** | | |
|---|---|---|---|---|---|---|---|
| A | B | A | B | C | B | C | D |
| 122 | 293 | 123.6 | 293.8 | 321.1 | — | 143.5 | — |

DRY-MESIC SAND PRAIRIE

| **1978** | | **1997** | | | **SAD** | | |
|---|---|---|---|---|---|---|---|
| A | B | A | B | C | B | C | D |
| 256 | 81 | 246.8 | 73.3 | 118.1 | — | 4,379.3 | 1282.2 |

DRY SAND SAVANNA

| **1978** | | **1997** | | | **SAD** | | |
|---|---|---|---|---|---|---|---|
| A | B | A | B | C | AB | C | D |
| 118 | 591 | 118 | 573 | 1265 | — | 85.6 | — |

DRY-MESIC SAND SAVANNA

| **1978** | | **1997** | | | **SAD** | | |
|---|---|---|---|---|---|---|---|
| A | B | A | B | C | AB | C | D |
| 53 | 470 | 53 | 464 | 566 | — | 283.7 | 50.3 |

DRY SAND FOREST

| **1978** | | **1997** | | | **SAD** | | |
|---|---|---|---|---|---|---|---|
| A | B | A | B | C | AB | C | D |
| 83 | 37 | 83 | — | 10 | — | 215.1 | 83.6 |

DRY-MESIC SAND FOREST

| **1978** | | **1997** | | | **SAD** | | |
|---|---|---|---|---|---|---|---|
| A | B | A | B | C | AB | C | D |
| 16 | — | 16 | — | — | — | 107.9 | 552.6 |

WET AND WET-MESIC FLOODPLAIN FOREST

| **1978** | | **1997** | | | **SAD** | | |
|---|---|---|---|---|---|---|---|
| A | B | A | B | C | AB | C | D |
| 833 | 5,139 | 16 | — | — | — | 5,564.7 | 131.0 |

MESIC FLOODPLAIN FOREST

| **1978** | | **1997** | | | **SAD** | | |
|---|---|---|---|---|---|---|---|
| A | B | A | B | C | AB | C | D |
| 36 | 174 | — | — | — | — | 16.3 | |

There are several sizable sand areas in Illinois that evidently do not have areas calculated yet as this information is not in the 1997 database. These include Nachusa Grassland (there is little natural prairie but considerable acerage has been planted), Green River Conservation Area (mainly tallgrass/wetlands), Colored Sands Bluff Nature Preserve (fewer than 100 acres), or Cass County. Nevertheless, it is clear that the Savanna Army Depot contains an extremely significant proportion of Grade C sand prairie, sand savanna, and sand forest in Illinois and indeed in North America.

With the near complete destruction of the tallgrass prairie ecosystem, especially east of the Mississippi River, (Steinauer and Collins 1996, Robertson et al. 1997) there are few opportunities to preserve large tracts, such as found at the Depot. According to a recently completed "A Conservation Assessment of the Terrestrial Ecoregions of North America" (Luoma 1997), the Central Tall Grasslands is a High-Risk Ecological Area, and the only extension of this area east of the Mississippi River is in extreme northwestern Illinois, which includes the Savanna Army Depot. The following statement is also pertinent: "...in the central United States most tallgrass prairie has been lost to the plow. The few unplowed prairie remnants are small and missing the migrations of bison and predation of wolves. Yet these fragments are the best examples we can find of a once extensive natural landscape. They are of value for the myriad plant and animal species they protect and for what they can teach us about the ecological functioning of these complex grasslands. Perhaps more importantly, a tallgrass prairie natural area is a part of our vanishing natural heritage" (Andrews 1996).

## SAND PRAIRIE — HISTORICALLY

Prior to becoming the Savanna Army Depot, most of the area with sandy soil was covered with sand prairie and was known locally as "The Prairie." We are fortunate indeed that this prairie vegetation was described in great detail by Gleason (1910), based on his field work conducted in 1908, some ten years before the Depot was established. Most of Gleason's 1910 publication is descriptive, but some quantitative data are presented. When Gleason visited the area in 1908, "By far the larger portion of the area was originally unforested. Large fields are still in a virgin condition, and hundreds of acres have been but little pastured."

As described in detail by Gleason (1910), the Hanover sand area was not a uniform prairie, but rather a mosaic of different types. He recognized two "associations" — (1) the Bunch-grass Association, where sand movement is relatively slow, several species of bunch-grasses are dominant, and secondary species are mostly perennials; this represents late successional areas with less disturbance and (2) the *Panicum pseudopubescens* [= *P. villosissimum*] Association where sand movement is rather rapid, and hairy panic grass is dominant and secondary species are mostly annuals. The Bunch-grass Association was divided by Gleason into five "consocies," which are listed below in the order of importance at the SAD in 1908 (scientific names follow those in Appendix 2, which sometimes differ from those originally used by Gleason).

### Bunch-Grass Association

**Mixed Consocies** — In 1908 the greatest portion of sand prairie was of this type, in which several different species of bunch grasses are well represented. According to Gleason, this consocies "grew alike on the higher elevations and on the depressions between the hills; that there was little difference in the vegetation as the habitat changed; and that the specific composition of the grasses varied considerably from place to place, but that the general appearance of the consocies was remarkably uniform." Gleason observed this consocies at Havana and Oquawka in addition to Hanover. In sampling done at Hanover, the dominant graminoids were: *Leptoloma cognatum* (fall witch grass), *Koeleria macrantha* (June grass), *Stipa spartea* (porcupine grass), *Sorghastrum nutans* (Indian grass), *Panicum linearifolium* (panic grass), *Panicum oligosanthes* (panic grass), *Carex muhlenbergii* (sand bracted-sedge), and *Bouteloua hirsuta* (hairy grama grass). The secondary species recorded by Gleason include: *Equisetum hyemale* (scouring rush), *Poa pratensis* (Kentucky bluegrass), *Petalostemum purpureum* (purple prairie clover), *Tephrosia virginiana* (goat's rue), *Polygala polygama* (purple milkwort), *Euphorbia corollata* (flowering spurge), *Viola pedata* (bird's-foot violet), *Callirhoë triangulata* (poppy mallow), *Lithospermum caroliniense* (hairy puccoon), *Asclepias viridiflora* (tall green milkweed), *Physalis virginiana* (ground cherry), *Aster sericeus* (silky aster), *A. linariifolius* (flax-leaved aster),

*Helianthus ridigus* (rigid sunflower), *Coreopsis palmata* (prairie coreopsis), *Artemisia campestris* (wormwood), *Selaginella rupestris* (dwarf spike-moss), *Opuntia macrorhiza* (prickly-pear), *Antennaria* sp. (pussytoes), *Vulpia octoflora* (six weeks fescue), *Chenopodium album* (lamb's quarters), *Arabis lyrata* (sand cress), *Hedeoma hispida* (rough pennyroyal), *Linaria canadensis* (blue toadflax), *Triodanis perfoliata* (Venus' looking glass), *Oenothera rhombipetala* (sand primrose), *Verbena bracteata* (creeping vervain), *Monarda punctata* (horsemint), *Erigeron strigosus* (daisy fleabane), and *Ambrosia psilostachya* (western ragweed). This consocies is still abundant at the Depot, albeit much modified by years of grazing by cattle and fire suppression.

***Leptoloma cognatum* Consocies** — Of this Gleason said "its flat-topped bunches are so confluent that nine-tenths of the surface or more is occupied. The bunches are of such uniform height and density that the consocies appears as if artificially trimmed, and has a generally gray-green color because of the numerous dead leaves mixed with the living." Gleason lists a large number of secondary species that occur in this consocies at Dixon and Oquawka areas in addition to the Hanover area, which is now the SAD. Some of these prominent at the Depot include: *Koeleria macrantha* (June grass), *Sorghastrum nutans* (Indian grass), *Panicum villosissimum* (hairy panic grass), *Euphorbia corollata* (flowering spurge), and *Helianthus rigidus* (rigid sunflower). Other species on Gleason's list that were probably present in this consocies at Hanover include: *Tradescantia ohiensis* (spiderwort), *Amorpha canescens* (lead plant), *Petalostemum purpureum* (purple prairie clover), *Tephrosia virginiana* (goat's rue), *Rhus aromatica* var. *arenaria* (sand fragrant sumac), *Ceanothus americanus* (New Jersey tea), *Callirhoë triangulata* (poppy mallow), *Viola pedata* (bird's-foot violet), *Asclepias viridiflora* (tall green milkweed), *Lithospermum caroliniense* (hairy puccoon), *Penstemon pallidus* (pale beardstongue), *Solidago nemoralis* (field goldenrod), *Aster linariifolius* (flax-leaved aster), *Selaginella rupestris* (dwarf spike-moss), *Opuntia macrorhiza* (prickly-pear), *Vulpia octoflora* (six-weeks fescue), *Arabis lyrata* (sand cress), *Lepidium virginicum* (common peppergrass), *Monarda punctata* (horsemint), *Hedeoma hispida* (rough pennyroyal), *Linaria canadensis* (blue toadflax), and *Ambrosia psilostachya* (western ragweed). In 1908, this consocies was extensively developed. While *Leptoloma cognatum* (fall witch grass) was present at the Depot in 1996, cattle grazing was so heavy during the fall growing season that we could not identify this consocies. However, considering the frequency with which we saw grazed plants of *Leptoloma cognatum*, it is likely that it would soon reappear if grazing were eliminated.

***Koeleria cristata*** (= *K. macrantha*) **Consocies** — June grass is the dominant species, covering ½ to ⅔ of the surface. *Panicum villosissimum* (hairy panic grass) was also frequent. Gleason listed many secondary species: *Panicum virgatum* (switch grass), *Stipa spartea* (porcupine grass), *Tradescantia ohiensis* (spiderwort), *Amorpha canescens* (lead plant), *Petalostemum purpureum* (purple prairie clover), *P. candidum* (white prairie clover), *Tephrosia virginiana* (goat's rue), *Viola pedata* (bird's-foot violet), *Callirhoë triangulata* (poppy mallow), *Lithospermum caroliniense* (hairy puccoon), *Penstemon pallidus* (pale beardstongue), *Solidago nemoralis* (field goldenrod), *Aster sericeus* (silky aster), *A. linariifolius* (flax-leaved aster), *Helianthus rigidus* (rigid sunflower), *Coreopsis palmata* (prairie coreopsis), *Artemisia campestris* (wormwood), *Selaginella rupestris* (dwarf spike-moss), *Opuntia macrorhiza* (prickly-pear), *O. fragilis* (fragile prickly-pear), *Antennaria* sp. (pussytoes), *Vulpia octoflora* (six-weeks fescue), *Rumex acetosella* (sour dock), *Lepidium virginicum* (common peppergrass), *Arabis lyrata* (sand cress), *Oxalis dillenii* (yellow wood sorrel), *Scutellaria parvula* (small scullcap), *Monarda punctata* (horsemint), and *Ambrosia psilostachya* (western ragweed). In 1908 this covered hundreds of acres, although in scattered patches of rather small size; it was found alike on the sides and tops of the hills, but seldom in the depressions between them. During 1996 we encountered several instances of this consocies in the dry-mesic sand prairie.

***Stipa spartea* Consocies** — Porcupine grass is dominant, with *Poa pratensis* (Kentucky bluegrass) second in abundance; between the two the surface of the sand is completely covered. A few individuals were observed of *Panicum villosissimum* (hairy panic grass), *Callirhoë triangulata* (poppy mallow), *Coreopsis palmata* (prairie coreopsis), and *Aster linariifolius* (flax-leaved aster). This consocies was found at only one place in 1908 and there of limited extent; it changed rather abruptly into the next consocies. In 1996 we observed one area that mostly corresponds to this consocies.

***Carex muhlenbergii* Consocies** — This species of *Carex* (sand bracted-sedge) is dominant and covers about ¾ of the surface. Secondary species include *Leptoloma cognatum* (fall witch grass), *Panicum virgatum* (switch grass), *Panicum villosissimum* (hairy panic grass), *Poa pratensis* (Kentucky bluegrass), *Lithospermum caroliniense* (hairy puccoon), *Penstemon pallidus* (pale beardstongue), *Solidago nemoralis* (field goldenrod), *Helianthus rigidus* (stiff sunflower), *H. occidentalis* (western sunflower), *Opuntia macrorhiza* (prickly-pear), *Monarda punctata* (horsemint), *Linaria canadensis* (blue toadflax), *Ambrosia psilostachya* (western ragweed), and *Lactuca canadensis* (tall lettuce). Gleason observed this in two places, the first in an interdunal depression and the second on side of a gentle slope. In 1996 we observed this consocies in Area 18.

***Panicum pseudopubescens* [= *P. villosissimum*] Association**

When Gleason studied the Hanover area in 1908, he found considerable development of this Association in areas where wind and opened up areas in the Bunch-grass Association; at least ¾ of vegetation cover was provided by this species. This association occurred only in isolated tracts of rather small size. To the west and northwest of this Association could be found the Bunch-grass Association, while open blowouts were found to the east and southeast. In addition to *P. villosissimum, P. linearifolium* (panic grass) and *Carex tonsa* (shaved sedge) were frequent. In this Association, other graminoids found scattered at wide intervals include *Schizachyrium scoparium* (little bluestem), *Leptoloma cognatum* (fall witch grass), *Panicum virgatum* (switch grass), *Bouteloua hirsuta* (hairy grama grass), *Elymus canadensis* (nodding wild rye), *Cyperus schweinitzii* (rough sand sedge), and *Carex muhlenbergii* (sedge). Gleason lists a large number of other perennial and annual species found in this Association, including *Talinum rugospermum*. In sampling done at the Hanover area using 12 quadrats of approximately 4m$^2$ each, he found the following species, with the number of quadrats in which each species occurred given in parentheses.

*Ambrosia psilostachya* (12)
*Lepidium virginicum* (9)
*Lithospermum caroliniense* (2)
*Oenothera rhombipetala* (1)
*Croton glandulosus* (1)
*Polygala polygama* (1)
*Linaria canadensis* (10)
*Helianthus rigidus* (4)
*Asclepias viridiflora* (2)
*Solidago nemoralis* (1)
*Silene antirrhina* (1)

SAND PRAIRIE — TODAY

Today, a remarkable amount of sand prairie still remains at the SAD, although almost all has been heavily impacted by activities resulting from construction of road, bunkers, and magazines and, especially, by long-term grazing by cattle (Bowles and Jones 1991, Bowles 1993, Bowles and Jones 1995). Probably more sand prairie is currently found at the SAD than anywhere else in Illinois, with the possible exception of Illinois Beach State Park in northeastern Illinois; however, the latter area has a very different species composition and moisture regimes. Most of the western ⅔ of the "Restricted Area" is in sand prairie, and substantial amounts of this habitat are also found outside the Restricted Area.

Following the classification system used by the Illinois Natural Areas Inventory (White and Madany 1978), the sand prairie areas in the SAD correspond to "dry sand prairie" and "dry-mesic sand prairie." From the limited sampling data and species listed included in Gleason (1908), the *Panicum pseudopubescens* [= *P. villosissimum*] Association corresponds to dry sand prairie. The various consocies of the Bunch-grass Association correspond to dry-mesic sand prairie. Gleason (1910) said that in 1908 the sand prairie extended all the way to very base of the bluffs. The area east of the present day SAD may have been in mesic sand prairie. Today this area is essentially all converted to agriculture, although we did observe a few plants characteristic of mesic sand prairie, such as pale coneflower (*Echinacea pallida*) and yellow coneflower (*Ratibida pinnata*), along the Burlington Northern railroad tracks just outside the SAD property line. Any areas of mesic sand prairie that might have once been inside the SAD have been destroyed, with one possible tiny area between the outer SAD road and Burlington Northern railroad track, just south and east of Area 46. It might be feasible to see if an area within the SAD adjacent to the railroad would revert to mesic sand prairie if protected from grazing and other disturbances.

**Dry Sand Prairie**

Dry sand prairie, following the classification of the Illinois Natural Areas Inventory (White 1978), is found mostly on the crests of sand dunes and is rather rare in Illinois; the soil lacks a dark A horizon and the vegetation is less than 1 meter tall. Dominant plant species include *Schizachyrium scoparium* (little bluestem), *Calamovilfa longifolia* (sand reed), *Koeleria macrantha* (June grass), and *Stipa spartea* (porcupine grass), while characteristic plants include *Minuartia stricta* (stiff sandwort), *Artemisia campestris* (beach wormwood), *Callirhoë triangulata* (poppy mallow), *Monarda punctata* (horsemint), and *Opuntia compressa* (prickly pear). This list of species was written when the SAD was not accessible to INAI field staff, and there are some differences: sand reed grass was not reported by Gleason and we found it only rarely in 1996, stiff sandwort evidently does not occur at the SAD, and the common species of *Opuntia* in northwestern Illinois is *O. macrorhiza* (Koelling 1996, McClain and Koelling 1992).

In 1996 we found only one area of dry sand prairie, located on the rolling top of a plateau in the NE ¼ of the SW ¼ of Section 30 [Area 18 on Map 1; Table 8]. The sandy soil is light in color with no dark A horizon. Numerous blowouts are scattered throughout.

**Area 18** – Grade C* – 143.5 acres (58.1 hectares) – Sampled 10 September 1996 – Tables 1E and 8. The dominant species were *Aristida oligantha* (three-awn grass), *Panicum villosissimum* (hairy panic grass), *Selaginella rupestris* (rock spike-moss), and *Panicum virgatum* (switch grass); a total of 31 species were encountered in the sampling, and bare ground was fairly common. Earlier, on 18 July, we observed about 60 species of prairie plants in this area, including *Croton glandulosus* var. *septentrionalis* (sand croton), *Lepidium virginicum* (common peppergrass), *Linaria canadensis* (blue toadflax), *Oenothera rhombipetala* (sand primrose), *Plantago patagonica* (salt-and-pepper plant), and *Vulpia octoflora* (six-weeks fescue); scattered individuals of more conservative species, such as *Petalostemum purpureum* (purple prairie clover) and *Amorpha canescens* (lead plant), were also present. Some early successional and non-native species that were rather infrequently observed include *Potentilla recta* (sulfur cinquefoil), *Achillea millefolium* (yarrow), *Bromus inermis* (awnless brome), and *Rumex acetosella* (sour dock); the last species was frequent at the SAD when Gleason studied the area.

While they did not show up in the sampling plots, this area contains large populations of Illinois Endangered and Threatened species: *Cyperus grayioides* (Gray's umbrella sedge), *Carex tonsa* (shaved sedge), *Hudsonia tomentosa* (false heather), *Polanisia jamesii* (James' clammyweed), and the former Category 2 Federal Candidate species *Talinum rugospermum* (fameflower).

This unit of dry sand prairie occupies 143.5 acres and is the only area identified in 1996 as this natural community. Cattle did not appear to graze here very much as conditions are dry, vegetation is sparser than surrounding areas, there is no source of water nearby, and there are few trees to provide shade. This area is rated as Grade C*. The asterisk indicates that the recovery potential is very high as there are a diversity of native species, conservative species are present, even though at low population levels, and non-native species occur with rather low frequency .

Dry sand prairie was probably never very abundant at the Depot. At first glance, some other areas at the Depot appear to be covered with degraded dry sand prairie, however the soil has a pronounced dark A horizon, which indicated that these areas are degraded dry-mesic prairies. Numerous sand blowouts occur throughout most of the Depot, and the plant species found in blowouts are often the same as those occurring in dry sand prairie; blowouts are discussed separately on page 27.

**Dry-Mesic Sand Prairie**

Dry-mesic sand prairie, following the classification of the Illinois Natural Areas Inventory (White and Madany 1978) has soil with a dark A horizon; the average height of grass and species diversity approach that of mesic sand prairie. Dominant plant species include *Schizachyrium scoparium* (little bluestem), *Sorghastrum nutans* (Indian grass), and *Stipa spartea* (porcupine grass), while characteristic plants include *Aster linariifolius* (flax-leaved aster), *Liatris aspera* (rough blazing-star), *Solidago speciosa* (showy goldenrod), and *Viola pedata* (bird's-foot violet). All of these plant species do occur at the Depot, where they are indicative of the dry-mesic sand prairie community.

As noted above, the different consocies of Gleason's Bunch-grass Association correspond to dry-mesic prairie, and the vast majority of what is today the SAD was covered in this natural community. Extensive tracts still remain, although all degraded by cattle grazing. Cattle exclosure fences have been put up around two fairly large areas, Areas 5 and 7 on Map 1 (40.71 acres or 16.4 hectares and 98.78 acres or 30.9 hectares respectively), in the past few years, and the latter area was burned in 1996. Both are showing significant signs of recovery.

A large number of prairie forbs occur in this prairie type. A few include *Tephrosia virginiana* (goat's-rue), *Petalostemum purpureum* (purple prairie clover), *Lespedeza capitata* (round-headed bush clover), *Liatris aspera* (rough blazing star), *Helianthus occidentalis* (western sunflower), *Heterotheca camporum* (golden aster), *Hieracium longipilum* (hairy hawkweed), *Aster linariifolius* and *A. sericeus* (flax-leaved and silky asters), *Callirhoë triangulata* (poppy mallow), *Lithospermum caroliniense* and *L. incisum* (hairy and fringed puccoons), *Euphorbia corollata* (flowering spurge), *Opuntia macrorhiza* (prickly pear), *Penstemon pallidus* (pale beardstongue), *Froelichia floridana* (cottonweed), and *Tradescantia ohiensis* (spiderwort). The state threatened *Besseya bullii* (kittentails) is found in this habitat. Fairly common throughout is the state endangered *Carex tonsa* (shaved sedge), and the former Category 2 Federal Candidate species *Talinum rugospermum* (fameflower) is found occasionally. A few shrubs also are present, such as *Rhus aromatica* var. *arenaria* (sand fragrant sumac), the state endangered *Ceanothus herbaceus* = *C. ovatus* (redroot), and old plants of *Amorpha canescens* (leadplant). Scattered individual trees of *Gleditsia triacanthos* (honey locust) and *Juniperus virginiana* (red cedar) occur as well as thickets of *Malus ioensis* (wild crabapple).

Dry-mesic sand prairie occurs in Areas 5, 6, 7, 10, 13, 17, 19, 20, 21, 26, 29, 30, 32, 35,36, 37, 40, 41, 43, 55, 56, and 62 (Table 8, Map 1). We sampled in eight different areas of this natural commnity representing different quality ratings. A summary of each of these eight areas is given below, arranged in approximate rank of decreasing natural quality.

**Area 5** - Grade C*- 40.6 acres (16.4 hectares) - Sampled 8 July 1996 - Tables 1A and 8. Dominated by *Schizachyrium scoparium* (little bluestem) and *Poa* spp. (*P. pratensis* and *P. compressa*,

bluegrass), little bare ground, 49 species encountered during sampling, and almost all of the species mentioned the two paragraphs above occur in Area 5. Overall, this is area probably contains the largest number of prairie species at the Depot. A cattle exclosure fence was constructed around this area in 1993. Several large sand blowouts occur within the boundaries of this area, and these contain typical plants of this community, as described below. Because of the past recent history of grazing and the resulting high frequencies of early successional and non-native species, this area is considered a Grade C* natural community. However, with the construction of the cattle exclosure fence and at least one prescribed fire, the area is showing significant recovery and is likely to continue improving. This is shown by the presence of a number of conservative, late-successional species, including *Amorpha canescens* (lead plant), *Aster linariifolius* and *A. sericeus* (flax-leaved and silky asters), *Hieracium longipilum* (hairy hawkweed), *Liatris aspera* (rough blazing star), *Lithospermum caroliniense* and *L. incisum* (hairy and fringed puccoons), *Petalostemum purpureum* (purple prairie clover), and *Tephrosia virginiana* (goat's-rue).

**Area 7** – Grade C* – 98.8 acres (40.0 hectares) – Sampled 9 July 1996 – Tables 1C and 8. Dominated by *Sorghastrum nutans* (Indian grass), with *Koeleria macrantha* (June grass) also common; 37 species encountered during sampling, and about 30 additional species were also observed. This is the cattle exclosure area around the Universal Function Test Range exclosure, and it was burned in the spring of 1996, with a wild fire burning part of the area again during the summer. Recent burning may have reduced amounts of *Poa* (bluegrass). Some late-successional species were observed, including *Amorpha canescens* (lead plant), *Liatris aspera* (rough blazing star), *Lithospermum caroliniense* (hairy puccoon), *Petalostemum purpureum* (purple prairie clover), and *Stipa spartea* (needlegrass). This area has the largest amounts of the tall prairie grasses — *Sorghastrum nutans* (Indian grass) and *Andropogon gerardii* (big bluestem) — that we observed at the Depot. The diversity of species that occur in this area due to the construction of the cattle exclosure fence and the recent history of fire indicate that it has high recovery potential. There is a large natural sand blowout complex included within this area.

**Area 32** – Grade C*– 151.2 acres (61.2 hectares) – Sampled 19 June 1996 – Tables 1H and 8. Dominated by *Carex pennsylvanica* (common oak sedge), *Selaginella rupestris* (dwarf spike-moss), and *Liatris aspera* (rough blazing star), 46 species encountered during sampling, much bare ground, probably from recent grazing, sampling in June may have led to under-representation of warm-season species. Other species observed but not encountered during sampling include: *Androsace occidentalis* (rock jasmine), *Callirhoë triangulata* (poppy mallow), *Linaria canadensis* (blue toadflax), *Lithospermum caroliniense* (hairy puccoon), *Penstemon pallidus* (pale beardstongue), *Sisyrinchium campestre* (prairie blue-eyed grass), and *Triodanis perfoliata* (Venus' looking glass). The area, encompassing 151 acres, is rather low and flat, contains no munitions bunkers or magazines, and contains few roads, although it lies between several railroad tracks. The diversity of spring flora showed much promise, but unfortunately the area was heavily grazed in the summer of 1996. Bowles and Jones (1991, 1995) noted that this area was dominated by *Schizachyrium scoparium* (little bluestem), *Panicum depauperatum* (starved panic grass), *Cyperus schweinitzii* (rough sand sedge), *Aristida tuberculosa* (beach three-awn grass), *Tephrosia virginiana* (goat's rue), *Selaginella rupestris* (dwarf spike-moss), *Ambrosia psilostachya* (western ragweed), and *Opuntia fragilis* (fragile prickly pear), and they also noted that it was overgrazed. Because of the high species diversity of native plants at the time of sampling, we consider this area to have high recovery potential.

**Area 55** – Grade C – 41.9 acres (17.0 hectares) – Sampled 10 September 1996 – Tables 1J and 8. Dominated by *Poa* spp. (*P. pratensis* and *P. compressa*, bluegrass) and *Koeleria macrantha* (June grass), with *Schizachyrium scoparium* (little bluestem), *Panicum villosissimum* (hairy panic grass), and *Sorghastrum nutans* (Indian grass) also rather frequent; 31 species encountered during sampling, little bare ground. This area is located in the wildlife viewing area at the north end of the Depot, and in 1996 there was little or only accidental cattle grazing. The dominance of *Poa* (bluegrass) in the area where transects were laid out may indicate some prior disturbance, although Gleason (1910)

noted *Poa* invading undisturbed prairies. The overall area is a mosaic that may reflect different past disturbances; few late-successional species were observed. Parts of the area have large amounts of *Sorghastrum nutans* (Indian grass).

**Area 13** – Grade C – 55.5 acres – Sampled 24 September 1996 – Tables 1D and 8. Dominated by *Poa* spp. (*P. pratensis* and *P. compressa*, bluegrass), *Andropogon gerardii* (big bluestem), and *Schizachyrium scoparium* (little bluestem); 29 species encountered during sampling, little bare ground. This area is located east of the railroad tracks and outside the area grazed by cattle, and since it is located near base housing and office buildings, it is unlikely to have been grazed much in the past. The general area near Area 13 has been used for outside storage for stockpiling materials and shipping containers, and is a diverse mosaic of vegetation types today. Looking at aerial photographs, the area demarcated here seems to have not had major physical disturbances since 1954, although we cannot say what might have happened prior to this. In addition to the species encountered during sampling, we noted the following: *Bouteloua hirsuta* (hairy grama), *Helianthus rigidus* (stiff sunflower), *Lespedeza capitata* (round-headed bush clover), *Liatris aspera* (rough blazing-star), *Panicum virgatum* (switch grass), *Petalostemum purpureum* (purple prairie clover), *Rhus aromatica* var. *arenaria* (sand fragrant sumac), *Solidago nemoralis* (field goldenrod), *Solidago speciosa* (showy goldenrod), *Stipa spartea* (needlegrass), and *Talinum rugospermum* (fameflower).

**Area 19** – Grade C – 3,017.1 acres (1221.5 hectares) – Sampled 20 June 1996 – Tables 1F and 8. Dominated by *Poa* spp. (*P. pratensis* and *P. compressa*, bluegrass) and *Carex pennsylvanica* (common oak sedge), with considerable *Schizachyrium scoparium* (little bluestem); 41 species encountered during sampling, but many quite infrequent, no bare ground. Sampling in June may have led to under-representation of warm-season species. This area appears to have been grazed for many years. These transects were taken in an area that represents the vegetation type and quality found today over much of the sand terrace; this Area is the largest polygon on the map of natural communities, encompassing over 3,000 acres. The landscape is basically in the original landcover of dry-mesic sand prairie, but it has been heavily impacted by the construction of roads and munitions bunkers and by a long history of grazing by cattle. As a result, there are many early successional species, while mid- to late-successional species are widely scattered and infrequent. However, over the entire 3,000 acres can be found nearly all the species expected in a dry-mesic sand prairie in northwestern Illinois. Because of the large size of this area, and given the resiliency of sand prairie vegetation, there is a good possibility that the vegetation could recover if cattle grazing was eliminated and a program of prescribed burning initiated . Sand blowouts occur throughout much of this area, and there are also small inclusions of sand savanna and sand forest. Below is an incomplete list of species that we observed in this overall area.

*Achillea millefolium* (yarrow)
*Ambrosia psilostachya* (western ragweed)
*Amorpha canescens* (lead plant)
*Andropogon gerardii* (big bluestem)
*Androsace occidentalis* (rock jasmine)
*Anemone caroliniana* (Carolina anemone)
*Antennaria neglecta* (cat's foot)
*Antennaria plantaginifolia* (pussytoes)
*Arabis glabra* (tower mustard)
*Arabis lyrata* (sand cress)
*Arenaria serpyllifolia* (thyme-leaved sandwort)
*Aristida tuberculosa* (beach three awn grass)
*Artemisia campestris* (wormwood)
*Artemisia ludoviciana* (white sage)
*Asclepias verticillata* (horsetail milkweed)
*Asclepias viridiflora* (tall green milkweed)
*Aster sericeus* (silky aster)
*Besseya bullii* (kitten tails)
*Bouteloua curtipendula* (side-oats grama)
*Bouteloua hirsuta* (hairy grama grass)
*Bromus inermis* (awnless brome)
*Bromus tectorum* (downy chess)
*Callirhoë triangulata* (poppy mallow)
*Carex brevior* (plains oval sedge)
*Carex muhlenbergii* (sand bracted sedge)
*Carex pensylvanica* (common oak sedge)
*Carex tonsa* (shaved sedge)
*Cassia fasciculata* (partridge pea)
*Ceanothus americanus* (New Jersey tea)
*Ceanothus herbaceus* (redroot)
*Chamaesyce geyeri* (Geyer's spurge)

*Chamaesyce maculata* (spotted spurge)
*Cirsium vulgare* (bull thistle)
*Comandra umbellata* (false toadflax)
*Coreopsis palmata* (prairie coreopsis)
*Coronilla varia* (crown vetch)
*Croton glandulosus* (sand croton)
*Cycloloma atriplicifolia* (winged pigweed)
*Cyperus filiculmis* var. *filiculmis* (slender sand sedge)
*Cyperus filiculmis* var. *macilentus* (slender sand sedge)
*Cyperus schweinitzii* (rough sand sedge)
*Descurainia pinnata* subsp. *brachycarpa* (tansy mustard)
*Dianthus armeria* (Deptford pink)
*Diodia teres* (rough buttonweed)
*Equisetum laevigatum* (smooth scouring rush)
*Eragrostis spectabilis* (tumblegrass)
*Erigeron strigosus* (daisy fleabane)
*Euphorbia corollata* (flowering spurge)
*Froelichia floridana* (cottonweed)
*Froelichia gracilis* (small cottonweed)
*Hedeoma hispida* (rough pennyroyal)
*Helianthemum bicknellii* (frostweed)
*Helianthemum canadense* (common rockrose)
*Helianthus annuus* (common sunflower)
*Helianthus occidentalis* (western sunflower)
*Helianthus mollis* (ashy sunflower)
*Heterotheca camporum* (golden aster)
*Hieracium longipilum* (hairy hawkweed)
*Hudsonia tomentosa* (false heather)
*Hypericum perforatum* (common St. John's weed)
*Juniperus virginiana* (red cedar)
*Koeleria macrantha* (June grass)
*Krigia virginiana* (dwarf dandelion)
*Lepidium campestre* (field peppergrass)
*Lepidium densiflorum* (small peppergrass)
*Leptoloma cognatum* (fall witch grass)
*Liatris aspera* (rough blazing star)
*Linaria canadensis* (blue toadflax)
*Linum sulcatum* (yellow flax)
*Lithospermum incisum* (fringed puccoon)
*Lithospermum caroliniense* (hairy puccoon)
*Melilotus alba* (white sweet clover)
*Melilotus officinalis* (yellow sweet clover)
*Mollugo verticillata* (carpetweed)
*Monarda punctata* (horsemint)
*Oenothera rhombipetala* (sand primrose)
*Opuntia macrorhiza* (prickly-pear)
*Oxalis dillenii* (yellow wood sorrel)
*Panicum linearifolium* (slender-leaved panic grass)
*Panicum oligosanthes* (few-flowered panic grass)
*Panicum villosissimum* (hairy panic grass)
*Panicum virgatum* (switch grass)
*Paspalum bushii* (hairy bead grass)
*Paspalum ciliatifolium* (paspalum)
*Penstemon pallidus* (pale beardstongue)
*Petalostemum purpureum* (purple prairie clover)
*Physalis heterophylla* (ground-cherry)
*Physalis longifolia* (longleaf ground-cherry)
*Plantago patagonica* var. *brevicarpa* (salt-and-pepper plant)
*Poa compressa* (Canadian bluegrass)
*Poa pratensis* (Kentucky bluegrass)
*Polanisia jamesii* (James' clammyweed)
*Polanisia dodecandra* (clammyweed)
*Polygala polygama* (purple milkwort)
*Polygonella articulata* (jointweed)
*Potentilla argentea* (silvery cinquefoil)
*Potentilla recta* (sulfur cinquefoil)
*Rhus aromatica* var. *arenaria* (sand aromatic sumac)
*Rumex acetosella* (sour dock)
*Saponaria officinalis* (bouncing bet)
*Schizachyrium scoparium* (little bluestem)
*Selaginella rupestris* (dwarf spike-rush)
*Senecio plattensis* (prairie groundsel)
*Silene antirrhina* (sleepy catchfly)
*Solanum caroliniense* (horse nettle)
*Solidago nemoralis* (field goldenrod)
*Sorghastrum nutans* (Indian grass)
*Spermolepis inermis* (scaleseed)
*Sporobolus cryptandrus* (sand dropseed)
*Stipa spartea* (needle grass)
*Strophostyles heveola* (trailing wild bean)
*Talinum rugospermum* (fameflower)
*Tephrosia virginiana* (goat's rue)
*Tradescantia ohiensis* (Ohio spiderwort)
*Tragopogon dubius* (sand goat's beard)
*Trifolium arvense* (rabbit-foot clover)
*Triplasis purpurea* (sand-grass)
*Verbascum thapsus* (woolly mullein)
*Verbena stricta* (hoary vervain)
*Viola pedata* (bird's foot violet)
*Vulpia octoflora* (six-weeks fescue)

**Area 43** – Grade C† – 45.9 acres (18.6 hectares) – Sampled 25 September 1996 – Tables 1I and 8. Dominated by *Sporobolus cryptandrus* (sand dropseed), *Poa* spp. (*P. pratensis* and *P. compressa*, bluegrass), *Vulpia octoflora* (six-weeks fescue), and *Koeleria macrantha* (June grass); 26 species encountered during sampling, bare ground common. When this site was visited in June, before cattle grazing commenced this year, there was an abundance of flowering *Koeleria macrantha* (June grass), resembling Gleason's description of the "*Koeleria cristata* (= *K. macrantha)*" consocies, although there was evidence of past grazing, such as browse lines on all the trees in the adjoining savanna and forest. When we returned in September for sampling, the area had been overgrazed, with the herbaceous vegetation only a few inches high. Overall species diversity is rather low. While a few mid- to late-successional species are present, such as *Callirhoë triangulata* (poppy mallow), *Lithospermum caroliniense* (hairy puccoon), *Lespedeza capitata* (round-headed bush clover), *Stipa spartea* (needlegrass), *Aster linariifolius* (flax-leaved aster), and *Amorpha canescens* (lead plant), most of the species are early successional or non-native. *Mirabilis hirsuta* (hairly umbrella wort) occurs at the edge of a savanna adjacent to Area 43. An examination of aerial photographs taken in 1946, 1954, 1970, and 1988 show this area progressing from completely open prairie to widely scattered trees to savanna and forest around the edges.

**Area 6** – Grade D – 258.6 acres – Sampled 9 July 1996 – Tables 1B and 8. Dominated by *Poa* spp. (*P. pratensis* and *P. compressa*, bluegrass), *Sporobolus cryptandrus* (sand dropseed), and *Plantago patagonica* (salt-and-pepper plant), with *Ambrosia trifida* (giant ragweed), *Arenaria serpyllifolia* (thyme-leaved sandwort), *Potentilla argentea* (silvery cinquefoil), *Bromus tectorum* (downy chess), *Potentilla recta* (sulfur cinquefoil), *Achillea millefolium* (yarrow), *Bromus racemosa* (smooth chess), and *Centaurea maculosa* (spotted knapweed) also fairly frequent; 29 species encountered during sampling, including many of early successional stages and numerous non-native species. This is clearly a highly disturbed area with mostly non-native and early successional native species. Aerial photographs from 1954 show evidence of some major disturbance occurring in this area. From the botanical point of view, this community has very little natural quality remaining, however native grassland birds and other animals may use this habitat. This same kind of vegetation is often found for 20–50 feet on either side of roads that dissect the Depot.

### Sand Savanna

The following recent quote is pertinent when discussing the savanna and forest communities at the SAD: "The conspicuous trees of the savannas were the open-grown oaks, but another, less visible size class was well represented. The groves of large oaks were surrounded by and intermingled with large numbers of oaks of a different size class — multi-stemmed grubs, mostly white and black oak, that were annually top-killed by fire, but whose roots continued to increase in size. These were the nascent oak woodlands and oak forests of the future, awaiting a break in the fire regime that would release them and change that part of the mosaic from sparse to dense trees. The widespread cessation of fire accompanying settlement allowed large numbers of these grubs to grow into even-aged oak woods — the last instance of widespread oak forest regeneration to take place in the region...." (Kline 1997). McClain et al. (1993) have used notes from the Public Land Office survey to show that a closed canopy forest in north central Illinois was likely a bur oak savanna prior to European settlement and that in the past 60 years other woody species have become abundant, creating the current forest.

Gleason (1910) discussed in great detail the succession from prairie to savanna to forest that he observed at what is now the SAD; see the Introduction to the Natural Communities section above. Gleason said "Establishment of the forest makes at first very little difference in the environment. The trees are relatively far apart, and sufficient light comes through the foliage to permit the growth of many species of the original bunch-grass. The edge of the forest, therefore, shows not a change in the flora but merely the addition of a few species. There are at present few places where the contact between forest and prairie can be observed. Of these, the best is in the Hanover area....." The term

"savanna" was not used by Gleason; rather, he included this natural community is his Black Oak Association, which had two groups: 1) the prairie group where the understory plants are largely prairie plants and 2) the forest group, where typical forest species prevail in the understory. What we call sand savannas today generally correspond to the former group, while sand forests belong to the latter. Gleason noted that "It is impossible, but also unnecessary, to draw a sharp line between the two groups," which indicates the continuum that occurred from prairie to savanna to forest. Apfelbaum and Haney (1991) present general trends in the degradation of tallgrass blacksoil savanna from pre-European settlement to the present in northern Illinois; they also commented that sand savannas in northern Indiana have been much slower to close in the absence of fire and that invasion of exotic species is less common.

The same is still largely true today. The examination of aerial photographs from 1946 to 1996 shows a great increase in tree cover at the Depot, probably in response to the elimination of fire. Different areas of sand savanna at the Depot show succession from prairie to savanna to forest in varying degrees. The savannas we consider sensitive all have at least some large open grown black oaks, which signify that these have been in savanna vegetation for a considerable time (see discussion in Szafoni et al. 1994). They also retain at least some of the herbaceous layer. Due to the lack of fire, a problem with nearly all of these savannas is the invasion of the more open areas by numerous young black oaks.

Savannas have been defined in many different ways (Nuzzo 1986, White 1994, Delong and Hooper 1996, Taft 1997); we follow the definition as used by Madany (1981) as "two-layered communities with 10–80 percent canopy coverage of trees and a nearly continuous ground layer of herbaceous species." For delimiting boundaries of savannas, we estimated ground cover using 1995 aerial photographs.

There have been several attempts to develop generalized species lists for savannas. Madany (1981) has a table of prevalent species in Illinois savannas, with one column for dry-mesic sand savannas, a type of savanna found at the Depot. Bowles and McBride (1995) give dominant species for many savanna remnants in the northern ⅔ of Illinois, but do not include sand savannas. Packard (1991) reproduced a historical species list originally compiled by Mead in 1846 for "barrens" in Hancock County. Packard and Ross (1997) include a table of "conservative savanna and woodland plants" for six geographic regions, including Illinois. Taft (1997) has a select list of 75 characteristic species of savannas and open woodlands in the upper Midwest. Betz and Lamp (1992) presented a list of plant species for sixteen old settler savanna and sand prairie cemeteries in northern Illinois and northwestern Indiana. Delong and Hooper (1996) examined regional and local floras for species that occurred in both prairie and broken woodland and in both openings and forest. They then compiled a detailed description of the habitat range for each species. As a result, they identified 252 species (39 graminoids, 183 forbs, 5 vines, and 25 shrubs and small trees) that could potentially occur in the understory of clay-loam savannas in Iowa; many of these species also occur at the Savanna Army Depot.

Two types of savanna occur at the Depot — dry sand savanna and dry-mesic savanna, both with *Quercus velutina* (black oak) the dominant tree. In the context of the Depot, differences between the two are slight and they can grade from one to the other. As is the situation with prairies, discussed above, grazing has caused a shift towards the dry end of the mesic to dry continuum. Scattered large, open grown *Quercus velutina* (black oak) trees, sometimes exceeding 3.3 feet (1 meter) in DBH, occur in most of the areas outlined as dry sand savanna or as dry-mesic sand savanna in Map 1.

All of the savannas at the Depot have been grazed by cattle, some more so than others. There are several areas within the Depot where the canopy of black oaks from a savanna remain, but the herbaceous layer has been completely destroyed by cattle grazing. *Prunus virginiana* (choke cherry),

*Cornus racemosa* (gray dogwood), and *Zanthoxylum americanum* (prickly ash) can form thickets in some degraded savannas, again due to fire suppression and grazing.

In a study of fire frequency on plant species in savanna sites in Minnesota, Tester (1996) found that an increase of 13 of 14 true prairie grasses and in 34 of 39 true prairie forbs was positively correlated with fire frequency. Another study in a Minnesota savanna (actually a bur oak-northern pin oak barren), Faber-Langendoen and Davis (1995) found a negative relationship between change in canopy cover and the number of burns after 25 years. Equivalent studies would be most appropriate at the SAD.

Several of the savanna areas include large blowouts, which often contain the state endangered *Hudsonia tomentosa* (false heather), *Carex tonsa* (shaved sedge), and *Polanisia jamesii* (James' clammyweed), as well as the former Category 2 Federal Candidate species *Talinum rugospermum* (fameflower); this is also the primary habitat for the state threatened *Cyperus grayioides* (Gray's umbrella sedge). The edges of oak savannas (and forests) are the habitat for the state endangered *Mirabilis hirsuta* (hairy umbrella wort).

**Dry Sand Savanna**

Dry sand savanna is mostly restricted to the tops of ridge systems in the Depot. *Quercus velutina* is often the only tree species, and the herbaceous species are mostly those given above under "Dry Sand Prairie." Sand blowouts often occur within the savanna areas. Dry-sand savanna occurs in Areas 4, 22, and 58 (Table 8, Map 1). We sampled the herbaceous vegetation in one of these during 1996.

**Area 22** – Grade C* – 33.3 acres (13.5 hectares) – Sampled 10 September 1996 – Tables 1G and 8. Dominated by *Poa* spp. (*P. pratensis* and *P. compressa*, bluegrass), *Tephrosia virginiana* (goat's rue), *Aristida tuberculosa* (beach three-awn grass), and *Carex pennsylvanica* (common oak sedge), with some *Selaginella rupestris* (dwarf spike-moss), *Panicum villosissimum* (hairy panic grass), *Ambrosia psilostachya* (western ragweed), *Andropogon gerardii* (big bluestem), and *Carex muhlenbergii* (sand bracted sedge), 30 species were encountered in the sampling. Bare ground was common. A cattle exclosure was constructed within part of this savanna, and the central part is showing signs of recovery.

**Area 4** – Grade C* – 11.5 acres (4.6 hectares) – Not sampled in 1996 – Table 8. This is an excellent example of dry sand savanna. Large open-grown black oaks occur throughout the area, and native plants dominate the herbaceous layer. Three state endangered plants grow here: *Hudsonia tomentosa* (false heather), *Carex tonsa* (shaved sedge), and *Polanisia jamesii* (James' clammyweed). The former Category 2 Federal Candidate species *Talinum rugospermum* (fameflower) is also present.

**Area 58** – Grade C – 40.8 acres (16.5 hectares) – Not sampled in 1996 – Table 8. This area is continuous with Area 39 (see below), but is dryer. The herbaceous layer is similar to the above areas; we also collected *Asclepias tuberosa* (butterfly weed) in this area.

**Dry-mesic Sand Savanna**

This natural community is usually found on the lower slopes of dunes and ridges. The dominant tree in these savannas is *Quercus velutina* (black oak), other trees occasionally found include *Juglans nigra* (black walnut) and *Prunus serotina* (black cherry). Shrubs are mostly absent, except for *Rhus aromatica* var. *arenaria* (sand fragrant sumac) and older plants of *Amorpha canescens* (lead plant). The herbaceous layer is mostly composed of the same species noted above for the Mixed Consocies. Particularly prominent in the best quality localities are *Koeleria macrantha* (June grass), *Schizachyrium scoparium* (little bluestem), *Tephrosia virginiana* (goat's-rue), and *Lithospermum caroliniense* (hairy puccoon). *Smilacina stellata* (starry false Solomon's seal) is frequent in more

mature savannas. Dry-mesic sand savanna occurs in Areas 24, 25, and 38. We sampled the herbaceous vegetation in one of these during 1996.

**Area 38** – Grade C (some C*) – 165.5 acres (66.9 hectares) – Sampled 25 September 1996 – Tables 1K and 8. Dominated by *Selaginella rupestris* (dwarf spike-moss), *Carex tonsa* (shaved sedge), and *Tephrosia virginiana* (goat's rue), with), *Poa* spp. (*P. pratensis* and *P. compressa*, bluegrass), *Aristida tuberculosa* (beach three-awn grass), *Panicum villosissimum* (hairy panic grass), *Schizachyrium scoparium* (little bluestem), and *Carex muhlenbergii* (sand bracted sedge), a total of 39 species were encountered during sampling, about half of them only once or twice. This savanna occupies a ridge and is quite dry in places, with numerous sand blowouts. Several roads dissect the area, and there are a few munitions bunkers. There is evidence of overgrazing, and bare ground is very common.

**Area 24** – Grade C* – 118.2 acres (47.8 hectares) – Not sampled in 1996 and **Area 25** – Grade D – 50.3 acres (20.3 hectares) – Not sampled in 1996 – Both Table 8. Situated on a dune ridge complex, Areas 24 and 25 have an extraordinarily large number, both in species diversity and numbers of individuals, of Endangered and Threatened plant species associated with them. Numerous roads traverse the areas and several dozen munitions magazines are located here; sand blowouts are frequent between and behind the magazines. The western part of this savanna complex, Area 24, exhibits a good diversity of native prairie plants in the understory and is graded as a C*. The eastern part, Area 25, has an understory of plants, including many non-native, that indicate a history of disturbance. It is primarily in the disturbed parts and the sand blowouts that most of the E&T species occur, including *Agropyron subsecundum* (bearded wheat grass), *Carex tonsa* (shaved sedge), *Cyperus grayioides* (Gray's umbrella sedge), *Hudsonia tomentosa* (false heather), *Mirabilis hirsuta* (hairy umbrella wort), *Polanisia jamesii* (James' clammyweed), *Salvia azurea* subsp. *pitcheri* (blue sage), and the rare and former Category 2 Federal Candidate species *Talinum rugospermum* (fame flower).

SAND FOREST

All of the sand forest at the Depot are of the dry sand and dry-mesic sand forest types as classified by the Illinois Natural Areas Inventory (White 1978). While a wide diversity of other forest types occur in Jo Daviess and adjacent Carroll counties (Pepoon 1909, 1910, 1919), they do not occur within the boundaries of the Depot. The dry sand forests are confined to the river dune along the Mississippi River, while the dry-mesic sand forests occur on the sand terrace, mostly toward the northern end of the Depot.

The total amount of dry sand forest at the Depot has very likely increased substantially since Gleason described them in 1910. Within the Depot is a continuum of succession: from open sand prairie → sand prairie with scattered young black oaks → sand prairie with rather dense young black oaks → young savanna with a canopy of black oaks and an understory of prairie plants → mature sand savanna → savanna with early forest species → thicket/forest → forest. Since the area became the Savanna Army Depot 1917, fire suppression has allowed this succession to occur (munitions storage and wild fires are incompatible). Taft (1997) presents a conceptual model showing developmental community trends with and without community or landscape-scale fire. It is evident from the study of aerial photographs from 1947 to 1995 that the amount of forest has increased at the Depot. Some of the forests at the north end of the restricted area have numerous dead black oak trees, probably the result of oak wilt disease. A report on forest management based on aerial photo interpretation followed by field verification and data collection was prepared by Swenson (1992/1995).

**Dry Sand Forest — River Dunes**

The extensive sand areas at the Savanna Army Depot were deposited by floodwaters of the Mississippi River resulting from glaciers melting at the end of the Wisconsinan glaciation (see Pielou

1991 for an excellent discussion of this glaciation and the period since). The area, called the "River Dunes" by Gleason (1909, 1910), includes the narrow ridge of dunes that borders the River. This ridge was formed, and maintained, by the westerly winds that carry sand from the rather narrow beaches along the river upwards along the slope and then deposit the sand into a long dune parallel with the river. This dune lies just eastward and up to 70 feet (21.4 meters) above the river and is 20 to 50 feet (6.1 to 15.3 meters) higher than the adjacent rolling sand terrace. It stretches for about 4.3 miles (6.9 kilometers) along the Mississippi River, beginning about 0.5 mile (0.8 kilometer) north of the mouth of the Apple River.

This dry sand forest on the River Dune complex is of considerable significance because nothing like it is left in Illinois. Gleason describes a somewhat similar area around Oquawka in Henderson County, but this has subsequently been heavily modified by agricultural activities.

The tops and lee slopes of the River Dunes are rather stable and Gleason (1909, 1910) described them as being covered with (1) dense young thickets, (2) mature thickets, and (3) black oak forest. Today, the dominant tree in these forests is still *Quercus velutina* (black oak), with members of this species far outnumbering members of other tree species. Pepoon (1910) also observed these forests and indicated that black oak is commonly the only notable tree species. There are numerous large black oak trees in this forest that appear to have grown in forest conditions, although some large, clearly open grown trees can be also found in the forests in some locations. Some large trees have been removed from these under a firewood program for employees. Dry sand forest occurs in Areas 2, 8, 9, and 16 (Table 8, Map 1).

Areas 2 and 16 (Map 1, Table 8) are classified as Grade C dry sand forest on Map 1 are of relatively good quality with mature trees, a well developed shrub layer, and a good diversity of herbaceous plants. All of the areas have been grazed by cattle, but the forest has retained much of its natural character. Area 9 retains the tree canopy but grazing has largely eliminated the native shrub and herbaceous layers; it is classified as Grade D Dry Sand Forest. Below is a list of species that we observed during 1996 in the dry sand forest on the River Dunes. Most of the woods in the River Dunes area are free of *Alliaria petiolata* (garlic mustard) thus far, which is common in woods in the north end of the Depot. A significant contribution to the biology of *Alliaria* is Cruden and McClain (1996). During 1996, we sampled the trees in one area of dry sand forest.

**Area 16** – Grade C* – 71.3 acres (28.9 hectares) – 16 October 1996 – four 625m$^2$ quadrats. Two of the quadrats were on the main ridge. All but two of the 101 trees with DBH > 5 cm (2 inches) in these quadrats were *Quercus velutina*. Most were relatively small (DBH < 20 cm or 7.9 inches), but a few large trees were interspersed. The other two quadrats were located on relatively flat ground east of the main ridge, a somewhat more mesic habitat. These quadrats had greater tree diversity (seven species), and though still dominated (or co-dominated) by *Q. velutina*, had considerable numbers of *Q. alba*. With the exception of one large *Prunus serotina*, the largest trees were *Q. velutina*, with all species represented in the small size classes. In addition to quantitative sampling, the following list of species were observed in the dry sand forest in Areas 2 and 16.

**Trees**
*Acer saccharinum* (silver maple)
*Betula nigra* (river birch)
*Carya cordiformis* (bitternut hickory)
*Celtis occidentalis* (hackberry)
*Fraxinus pennsylvanica* (green ash)
*Gleditsia triacanthos* (honey locust)
*Juniperus virginiana* (red cedar)
*Populus deltoides* (cottonwood)
*Prunus serotina* (black cherry)
*Quercus alba* (white oak)
*Quercus macrocarpa* (bur oak)
*Quercus velutina* (black oak)
*Ulmus americana* (American elm)

**Shrubs**
*Corylus americana* (hazelnut)
*Prunus virginiana* (choke cherry)
*Zanthoxylum americanum* (prickly ash)

**Vines**
*Celastrus scandens* (bittersweet)
*Menispermum canadense* (moonseed)
*Parthenocissus quinquefolia* (Virginia creeper)
*Parthenocissus vitacea* (thicket creeper)
*Smilax hispida* (bristly catbrier)
*Smilax lasioneuron* (carrion flower)
*Toxicodendron radicans* (poison ivy)

**Herbs**
*Aralia nudicaulis* (wild sarsaparilla)
*Arisaema triphyllum* (Jack-in-the-pulpit)
*Besseya bullii* (kittentails)
*Circaea lutetiana* (enchanter's nightshade)
*Desmodium glutinosum* (pointed tick trefoil)
*Osmorhiza claytonii* and *O. longistylis* (sweet Cicely)
*Podophyllum peltatum* (Mayapple)
*Sanguinaria canadensis* (bloodroot)
*Scutellaria ovata* (heart-leaved skullcap)

**Dry-Mesic Sand Forests**

Dry-mesic sand forests occur on the sand terrace of the Depot. Very large black oaks that were clearly open grown can be found within many of the forested areas at the Depot, indicating the area was once savanna and has undergone succession into forest. Large forest grown black oaks, a few exceeding 1.3 meter (4.3 feet) DBH, can also be found in these forests. A few forests have a fairly good diversity of trees, shrubs, and spring woodland wildflowers. Newly discovered at the SAD at the edge of a forest is the state endangered meadow horsetail (*Equisetum pratense*).

Dry-mesic sand forest occurs in Areas 14, 34, 39, 42, 45, 47, 48, 49, 51, 53, and 54 (Table 8, Map 1). The three areas of dry-mesic sand forest that we have graded as Grade C (Areas 47, 49, 54) have relatively good diversity of plant species The dominant species is *Quercus alba* (white oak), and some of these have quite large trunks with upward ascending branches and are clearly forest grown trees. These three areas were in forest cover on aerial photographs dating from 1946 and 1955, and the size and diversity of woody species indicate that these are first-growth forests. During 1996, we sampled the trees in one area of dry-mesic sand forest.

**Area 47** – Grade C – 39.3 acres (15.9 hectares) – 16 October 1996 – four 625 $m^2$ (6798 $ft^2$) quadrats. These quadrats showed higher diversity than the other sample areas, with 13 tree species encountered. As might be expected in more diverse woods, the area was heterogeneous. Only two tree species, *Quercus alba* and *Prunus serotina*, were found in all four quadrats, whereas four species appeared in only two quadrats and five species in only one. Three quadrats were dominated by *Q. alba*, but the fourth was dominated by *Q. velutina*, which was scarce in one quadrat and absent in another. The rare *Juglans cinerea* (white walnut) was found in this woods. *Robinia pseudoacacia* (black locust) was relatively important in two quadrats but absent in the other two. As a result of this heterogeneity, the quadrats did not cluster closely with PCA (Figure 2). In all four quadrats, a wide range of tree sizes was present for most species, suggesting that the woods are stable. In addition to quantitative sampling, the following list of species were observed dry-mesic sand forests at the Depot.

**Trees**
*Betula nigra* (river birch)
*Carya cordiformis* (bitternut hickory)
*Celtis occidentalis* (hackberry)
*Fraxinus pennsylvanica* (green ash)
*Gleditsia triacanthos* (honey locust)
*Juglans cinerea* (white walnut)
*Juglans nigra* (black walnut)
*Juniperus virginiana* (red cedar)
*Morus alba* (white mulberry)
*Populus tremuloides* (quaking aspen)
*Prunus serotina* (black cherry)
*Quercus alba* (white oak)
*Quercus rubra* (northern red oak)
*Quercus velutina* (black oak)
*Robinia pseudoacacia* (black locust)
*Tilia americana* (basswood)
*Ulmus americana* (American elm)
*Ulmus rubra* (slippery elm)

**Shrubs**
*Berberis thunbergii* (Japanese barberry)
*Cornus racemosa* (gray dogwood)
*Corylus americana* (hazelnut)

*Lonicera morrowii* (bush honeysuckle)
*Rhamnus cathartica* (buckthorn)
*Ribes missouriense* (Missouri gooseberry)
*Rosa multiflora* (multiflora rose)
*Rubus allegheniensis* (blackberry)
*Rubus occidentalis* (black raspberry)
*Zanthoxylum americanum* (prickly ash)

**Vines**
*Celastrus scandens* bittersweet)
*Menispermum canadense* (moonseed)
*Smilax hispida* (bristly catbrier)
*Toxicodendron radicans* (poison ivy)
*Vitis riparia* (riverbank grape)

**Herbs**
*Agrimonia gryposepala* (tall agrimony)
*Alliaria officinalis* (garlic mustard)
*Amphicarpa bracteata* (hog-peanut)
*Athrium felix-femina* (lady fern)
*Carex pensylvanica* (common oak sedge)
*Carex typhina* (common cattail sedge)
*Desmodium glutinosum* (pointed tick trefoil)
*Elymus virginicus* (Virginia wild rye)
*Eupatorium maculatum* (spotted Joe-Pye weed)
*Eupatorium rugosum* (white snakeroot)
*Galearis spectabilis* (showy orchid)
*Galium concinnum* (shining bedstraw)
*Geum canadense* (white avens)
*Hackelia virginiana* (stickseed)
*Laportea canadensis* (woodnettle)
*Osmunda claytoniana* (cinnamon fern)
*Osmorhiza claytonii* (hairy sweet cicely)
*Osmorhiza longistylis* (smooth sweet cicely)
*Phryma leptostachya* (lopseed)
*Pilea pumila* (clearweed)
*Podophyllum peltatum* (May apple)
*Polygonum virginianum* (jumpseed)
*Sanicula odorata* (snakeroot)
*Urtica dioica* (stinging nettle)

**Areas 49 and 54** were not sampled. Field reconnaissance in 1996 showed that they have a good diversity of canopy trees, understory trees, shrubs, and herbaceous layer, with little evidence of recent grazing. Aerial photography shows these forest to have been present in the 1940s, and are likely first growth forests.

**Area 48** – Grade D – 106.7 acres (43.2 hectare) – 16 October 1996 – two 625m$^2$ (6707 ft$^2$)quadrats. A striking feature of these quadrats was the clear dominance of *Juglans nigra*, which was absent in the other sampled woods. Also striking was the near absence of large trees: of 50 trees sampled, only one *Juniperus virginiana*, one *Quercus velutina*, and three *J. nigra* exceeded 30 cm (11.8 inches) DBH. These results are consistent with these woods being relatively young second-growth.

Aerial photography clearly shows that the eight areas we considered Grade D (Areas 14, 34, 39, 42, 45, 48, 51, 53) are second grown dry-mesic sand forests. Most of these have been severely grazed by cattle to the extent that the original herbaceous and shrub layers are destroyed. In many instances, there is just pasture or mostly bare sand under these forests, while in other cases the understory contains weedy native species and non-native species, such as *Alliaria petiolata* (garlic mustard), *Rosa multiflora* (multiflora rose), *Lonicera tatarica* and *L. morrowii* (bush honeysuckles), and *Rhamnus cathartica* (buckthorn). These are all considered Grade D Dry Sand Forest.

FLOODPLAIN FOREST

About half of the area at the Savanna Army Depot is covered with floodplain forest, most of it in the modern floodplain of the Mississippi River, especially south of the levee for Lock and Dam No. 12. This area is a mosaic of low islands covered with wet floodplain forest, sloughs, lakes, and channels. There is also a small amount along the Apple River, which empties into the Mississippi at the southern end of the Depot. Additional floodplain forest extends across a "neck" of the inland part of the depot just south of the creek that flows out of Beaty Hollow, near Blanding, and then southeastward along part of the eastern limit of the Depot property. The floodplain forests at the Savanna Army Depot are primarily wet floodplain forest and wet-mesic floodplain forest and to a lesser extent mesic floodplain forest. The construction of the levee and Lock and Dam No. 12 in the 1930s has undoubtedly affected the extent and stability of the floodplain forests along the Mississippi

River. On the 1913 Galena topographic map (scale 1/62500), published before either the lock and dam or the Depot were established, there is a broad, even, and continuous floodplain forest. Following construction of the lock and dam, the wet floodplain forest above the levee has essentially been eliminated due to the higher water level. An examination of topographic maps made before (15' quads, 1913) and after (7.5' quads, 1968) Lock and Dam No. 12 was constructed revealed that the extent of the floodplain forest below the dam appears to have changed little, and most of the sloughs and channels that were surveyed in 1909/1911 could be readily identified in approximately the same locations on maps based on surveys and aerial photography dating from the 1960s and 1970s. However, the construction of the lock and dam largely flooded out and eliminated the extensive floodplain forest that was located above them.

**Wet and Wet-mesic Floodplain Forest**

**Areas 1 and 33** — Grade C — 5,552.7 acres (2,243.3 hectares) including sloughs — Not Sampled. These two large area are adjacent to the Mississippi River. They were previously surveyed from a forest management perspective by (Swenson 1992/1995), and we only conducted field reconnaissance during 1996. The forestry data, confirmed by our observations, indicate that *Acer saccharinum* (silver maple) is the most abundant tree species in large tracts of Areas 1 and 33; in many locations it is the only tree species present. Other locally important tree species include *Populus deltoides* (eastern cottonwood), *Fraxinus pennsylvanica* (green ash), *Salix nigra* (black willow), *Acer negundo* (box elder), *Betula nigra* (river birch), *Gleditsia triacanthos* (honey locust), *Quercus palustris* (pin oak), *Celtis occidentalis* (hackberry), *Ulmus rubra* (slippery elm), *Ulmus americana* (American elm), and the non-native *Morus alba* (white mulberry). In particular, *Quercus palustris* (pin oak) occurs frequently in some tracts, and scattered tracts contain large, mature trees of silver maple, pin oak, and cottonwood. On slightly higher terrain can be found *Juglans nigra* (black walnut), *Quercus alba* (white oak), *Quercus rubra* (northern red oak), *Quercus macrocarpa* (bur oak), *Prunus serotina* (black cherry), *Carya cordiformis* (bitternut hickory), and *Tilia americana* (basswood).

Some tracts in Areas 1 and 33 have been selectively logged Swenson (1992/1995), as shown by stump sprouts and even-aged stands of trees. Records at the SAD (cited by Swenson) show that up to 36% of the trees in the floodplain forest were elms prior to 1960. However, in the intervening years Dutch Elm Disease has decimated most American elms and greatly altered the structure of the forest. *Phalaris arundinacea* (reed canary grass), a very aggressive species, is widespread in the floodplain forest, but, at least thus far, *Lythrum salicaria* (purple loosestrife) is very scarce.

Degraded, Grade D wet-mesic floodplain forest occurs in Areas 23, 27, 31, 46, and 57. Area 44 is wet-mesic floodplain forest along a small stream, and this area can be seen on aerial photographs taken in the 1940s. Since it is probably first-growth forest and ground reconnaissance indicated good forest structure, Area 44 is considered Grade C; it is 12.0 acres (4.8 hectares) in extent. Some species observed in wet and wet-mesic floodplain forests at the SAD are given below.

**Trees**
*Acer negundo* (box elder)
*Acer saccharinum* (silver maple)
*Fraxinus pennsylvanica* (green ash)
*Gleditsia triacanthos* (honey locust)
*Morus alba* (white mulberry)
*Populus deltoides* (eastern cottonwood)
*Quercus palustris* (pin oak)
*Salix nigra* (black willow)
*Ulmus americana* (American elm)

**Shrubs**
*Cephalanthus occidentalis* (buttonbush)
*Sambucus canadensis* (elderberry)

**Woody vines**
*Menispermum canadense* (moonseed)
*Parthenocissus quinquefolia* (Virginia creeper)
*Parthenocissus vitacea* (thicket creeper)
*Smilax hispida* (bristly catbrier)
*Toxicodendron radicans* (poison ivy)
*Vitis riparia* (riverbank grape)

**herbaceous layer**
*Amaranthus rudis* (water hemp)
*Ambrosia trifida* (giant ragweed)
*Ammannia coccinea* (tooth-cup)
*Aster lanceolatus* (panicled aster)
*Aster lateriflorus* (starved aster)
*Aster ontarionis* (Ontario aster)
*Aster puniceus* (purple-stemmed aster)
*Bidens cernua* (bur-marigold)
*Bidens tripartita* (beggar-ticks)
*Bidens vulgata* (tall beggar-ticks)
*Boehmeria cylindrica* (false nettle)
*Carex grayi* (common bur sedge)
*Cyperus aristatus* (flatsedge)
*Cyperus erythrorhizos* (redroot flatsedge)
*Cyperus odoratus* (flatsedge)
*Elymus virginicus* (Virginia wild rye)
*Erechtites hieracifolia* (fireweed)
*Geum laciniatum* (rough avens)
*Helenium autumnale* (common sneezeweed)
*Hibiscus laevis* (smooth rose-mallow)
*Humulus lupulus* (common hops)
*Impatiens capensis* (orange touch-me-not)
*Iris shrevei* (blue flag)
*Laportea canadensis* (wood nettle)
*Leersia oryzoides* (rice cut-grass)
*Leersia virginica* (white grass)
*Lycopus americanus* (common water horehound)
*Lycopus uniflorus* (northern water horehound)
*Osmorhiza longistylis* (smooth sweet cicely)
*Phalaris arundinacea* (reed canary grass)
*Physostegia virginiana* (obedient plant)
*Phytolacca americana* (pokeweed)
*Polygonum amphibium* (water smartweed)
*Rotala ramosior* (wheelwort)
*Rudbeckia laciniata* (green coneflower)
*Sagittaria latifolia* (common arrow-head)
*Sanicula odorata* (snakeroot)
*Scutellaria lateriflora* (mad-dog skullcap)
*Sicyos angulatus* (bur-cucumber)
*Solidago gigantea* (smooth goldenrod)
*Urtica dioica* (stinging nettle)
*Vernonia fasciculata* (smooth ironweed)

**Mesic Floodplain Forest**

Along the Apple River is an area of mesic floodplain forest (Area 59), which covers 16.3 acres (6.6 hectares). It is dominated by *Carya cordiformis* (bitternut hickory), *Quercus rubra* (northern red oak), and *Prunus serotina* (black cherry). This is located on a small terrace just above the river on the west side. A list of species observed on 22 October 1996 is given below.

**Trees**
*Carya cordiformis* (bitternut hickory)
*Celtis occidentalis* (hackberry)
*Gleditsia triacanthos* (honeylocust)
*Gymnocladus dioicus* (Kentucky coffeetree)
*Juglans nigra* (black walnut)
*Prunus serotina* (black cherry)
*Quercus macrocarpa* (bur oak)
*Quercus rubra* (northern red oak)
*Tilia americana* (basswood)

**Shrubs**
*Cornus racemosa* (gray dogwood)
*Corylus americana* (hazelnut)
*Lonicera morrowii* (bush honeysuckle)
*Ribes missouriense* (Missouri gooseberry)
*Rubus occidentalis* (black raspberry)
*Sambucus canadensis* (elderberry)
*Zanthoxylum americanum* (prickly ash)

**Herbs**
*Botrychium dissectum* (dissected grape fern)
*Botrychium virginianum* (rattlesnake fern)
*Campanula americana* (American bellflower)
*Cinna arundinacea* (common wood reed)
*Eupatorium purpureum* (spotted Joe-Pye-weed)
*Eupatorium rugosum* (white snakeroot)
*Hackelia virginiana* (stickseed)
*Hydrophyllum virginianum* (great waterleaf)
*Liparis liliifolia* (large twayblade)
*Ophioglossum pusillum* (northern adder's tongue)
*Osmorhiza longistylis* (smooth sweet cicely)
*Osmunda claytoniana* (interrupted fern)
*Sanicula odorata* (snakeroot)

**Aquatic Vascular Plants**

We did not make exhaustive searches for aquatic vascular plants in open water within with Mississippi River floodplain because the National Biological Service river survey team had previously mapped the wetlands. However, we did find one site north of the Corps of Engineers levee at Lock and Dam No. 12, in

the northwestern part of the Depot (Area 50), where there are extensive beds of emergent, floating, and submerged aquatic plants. Smaller areas similar to this exist around backwater lakes within the extensive bottomland area of the Depot. We observed the following species.

*Ceratophyllum demersum* (hornwort)
*Elodea nuttallii* (waterweed)
*Heteranthera dubia* (water star-grass)
*Lemna minor* (lesser duckweed)
*Myriophyllum spicatum* (European water-milfoil)
*Najas minor* (naiad)
*Nelumbo lutea* (American lotus)
*Nymphaea tuberosa* (water-lily)
*Potamogeton crispus* (curly pondweed)
*Potamogeton nodosus* (long-leaved pondweed)
*Potamogeton pectinatus* (sago pondweed)
*Potamogeton pusillus* (slender pondweed)
*Spirodela polyrhiza* (greater duckweed)
*Vallisneria americana* (eelgrass)
*Wolffia columbiana* (water meal)

PRIMARY HABITATS

There are two primary natural community types at the Depot, which are maintained indefinitely at an early state of succession by natural disturbances. These are the sand river bluff along the Mississippi River and the many sand blowouts that are widespread. Neither of these natural communities is included in White (1978), but they seem to best fit in the Primary Class following that system of natural community classification. Since both communities by definition are in early successional stages, the use of quality grading does not have much meaning. However, both the river bluff and the sand blowouts are outstanding natural features of the Savanna Army Depot.

**River Bluff**

The windward slopes facing the river are steep, mostly open sand. As noted by Gleason (1910), there are three zones — lower slope, middle slope, and upper slope. On 16 and 17 July 1996, L. R. Phillippe observed a total of 91 species on this open sand river bank bluff. A diversity of sand prairie species are found on the open slopes, including the state endangered *Polanisia jamesii* (James' clammyweed) and a few plants of *Carex tonsa* (shaved sedge). Other plants frequent on the slopes include *Polanisia dodecandra* (clammyweed), *Croton glandulosus* (sand croton), *Teucrium canadense* (germander), *Diodia teres* (rough buttonweed), *Hedeoma hispida* (rough pennyroyal), *Elymus canadensis* (nodding wild rye), *Chamaechrista fasciculata* (partridge pea), *Tephrosia virginiana* (goat's-rue), *Strophostyles helvola* (wild bean), *Asclepias viridiflora* (green milkweed), *Cyperus schweinitzii* (rough sand sedge), and *Lithospermum caroliniense* (hairy puccoon). The non-native *Saponaria officinalis* (bouncing bet) is frequently abundant, as is *Froelichia gracilis* (small cottonweed). Some woody plants occur on the slope, including *Quercus velutina* (black oak), *Gymnocladus dioicus* (Kentucky coffee tree), *Juglans nigra* (black walnut), *Celtis occidentalis* (hackberry), *Fraxinus pennsylvanica* (green ash), *Prunus serotina* (black cherry), *Acer saccharinum* (silver maple), saplings of *Ulmus americana* (American elm), and *Juniperus virginiana* (red cedar). Shrubs include: *Ribes missouriensis* (Missouri gooseberry), *Rhus aromatica* var. *arenaria* (sand fragrant sumac), *Amorpha fruticosa* (false indigo), *Cephalanthus occidentalis* (buttonbush), *Cornus racemosa* (gray dogwood), and *Rubus occidentalis* (black raspberry). Woody vines included bristly *Smilax hispida* (catbrier), *Parthenocissus quinquefolia* (Virginia creeper), *Menispermum canadense* (moonseed), *Celastrus scandens* (bittersweet), *Toxicodendron radicans* (poison-ivy), and *Vitis riparia* (river grape).

While most of the tops of the River Dunes are now covered with forest, blowouts occur in a few places. These have the typical blowout vegetation discussed below; the state endangered *Polanisia jamesii* (James' clammyweed) is abundant in some of these blowouts. A few plants of the state endangered *Ceanothus herbaceus* = *C. ovatus* (redroot) occur on top of the open river dunes. The construction of Lock and Dam No. 12 in the 1930s has probably stabilized the river dune somewhat from direct erosion by seasonal floods of the Mississippi River. Today it resembles the photographs of the same habitat in Gleason (1910).

**Sand Blowouts**

Scattered throughout much of the SAD are sand blowouts. These vary in size from 20 feet (6.1 meters) to several acres. One of the largest blowouts, covering 3.7 acres (1.5 hectares) is Area 60 on Map 1. Many of these blowouts are natural, while others appear to be man-made. Good examples of the latter are the areas between the bunkers and also in areas where sand was excavated for use elsewhere at the Depot. The whole blowout complex at the SAD is the largest in the state, and many of the endangered and threatened plant species occur in and around these blowouts, such as *Polanisia jamesii* (James' clammyweed), *Carex tonsa* (shaved sedge), *Cyperus grayioides* (umbrella sedge), and *Hudsonia tomentosa* (false heather). *Talinum rugospermum* (fameflower), a former Category 2 Federal Candidate species, also is found primarily along the upper margins of blowouts. Other characteristic plants of the blowouts include *Chamaesyce geyeri* (Geyer's spurge), *Croton glandulosus* (sand croton), *Diodia teres* (rough buttonweed), *Cyperus schweinitzii* (Schweinitz's sedge), *Polygonella articulata* (jointweed), *Asclepias viridiflora* (green milkweed), *Polanisia dodecandra* (clammyweed), *Aristida tuberculosa* (beach three awn grass), and *Mollugo verticillata* (carpetweed).

Today, there are many sand blowouts throughout much of the terrace part of the Depot. Only one complex is outlined on Map 1 (Area 60), but concentrations of significant blowouts also occur in Areas 2, 4, 5, 6, 7, 13, 16, 18, 19, 20, 22, 24, 25, 26, 32, 36, 37, 38, 41, 55, and 62.

Many blowouts today look much the same as they did in the photographs in Gleason (1910). Cattle have severely trampled many of the blowouts, but since these are primary natural communities, this has probably not caused permanent damage. Gleason (1910) thoroughly described the processes of blowout formation and the distinct vegetation associations found on the windward slope, the basin, the lee slope, and the deposits. The same processes can be seen operating today at the Depot. It is most unusual in Illinois today to have sand blowout formation still occurring today on a landscape scale much as it did nearly 100 years ago, but this is the case at the Depot.

## Results of Multivariate Analyses

Principal components analysis (PCA) is an ordination method that uses the covariance among variables (for example species abundances) to represent the variation in the unclassified data set on a new set of synthetic axes, or components. The first component explains the most variation in the original variables, with successive components explaining progressively less. Visual examination is used a posteriori to assess groups within the data. The relative importance of the variables for distinguishing the groups can be evaluated by looking at the loadings (weights) of the variables along the various components.

In community ecology, PCA can be used to ordinate the samples into groups, facilitating classification of the samples. In this study, we used PCA to examine the relationships among the sampled plots based directly on the measured species abundances (prairies and savannas) or abundances and basal areas combined into importance values (forests). These relationships can then be compared with the classification and grading on the sites based on the INAI criteria.

**Prairie and Savanna Data.** The results of PCA of the prairie and savanna sites are shown in Figure 1, with loadings for individual taxa in Table 6. Three groups of sites are identifiable. Most distinct is the Area 6, characterized by an abundance of weedy species and graded "D." A series of sites (18, 22, 32, 38) with much bare ground and little *Koeleria macrantha* or *Sorghastrum nutans* forms the second group. These areas include both dry and dry-mesic sites, and both sand prairie and sand savanna. Their proximity in the PCA probably reflects a combination of relative dryness, even for the dry-mesic sites, reducing the abundance of *Koeleria* and *Sorghastrum,* and relatively recent grazing, promoting bare ground and associated species. The third set of sites (5, 7, 13, 19, 43, 55) form a very diffuse group, but all have few weedy species other than *Poa* spp., little bare ground

(except for Area 43), and moderate to high abundance of *Koeleria macrantha* or *Sorghastrum nutans* or both. These sites, especially those with more negative values on the second principal component, tend to be more mesic than those in the second group, and we had classified them all as dry-mesic sand prairie. Three subgroups can be recognized. The first (areas 5, 13, 19, and 43) are dominated by *Poa* spp. (*P. pratensis* and *P. compressa*). This probably reflects long-term disturbance, and all but area 5 in this group we assigned grade C or C†. Area 5, in contrast, we classified as C*, reflecting the improvement seen due to the exclusion of cattle from this area. *Poa* spp. dominate in the second group (55), also graded C, but these species share dominance with *Koeleria macrantha*, and *Sorghastrum nutans* is fairly frequent, reflecting a more mesic site. Finally, the third group (7) is dominated by *Koeleria* and *Sorghastrum*, but had little *Poa*. This dry mesic site we graded C*.

Thus PCA of the prairie and savanna sites ordinates sites according to differences in the abundance of (1) weedy species, which may reflect long-term disturbance history; (2) bare ground, which may reflect recent disturbance history, especially from grazing; and (3) species that indicate the soil moisture of the site on a dry to dry-mesic gradient. These results are generally consistent with the classification and grading of the sites using the INAI criteria.

**Forest Data**. The results of PCA of the forest data are shown in Figure 2, with the loadings for individual species in Table 7. The plots sorted primarily according to three species: *Juglans nigra* (black walnut), *Quercus alba* (white oak), and *Q. velutina* (black oak). Two plots found at the crest of the river dune (RD1 and RD2, both in Area 16) consisted almost exclusively of *Q. velutina*. In contrast, the two river dune plots found in the flats (RD3 and RD4, also in Area 16) were more diverse and contained many *Q. alba* and fewer *Q. velutina*. Three of the northern woods plots (NW1, 3, and 4, all in Area 47) were also relatively diverse with many *Q. alba* and few or no *Q. velutina*, although the fourth plot (NW2) was relatively higher in *Q. velutina*. Both NW1 and NW2 had abundant *Robinia pseudoacacia* (black locust), which was not found in the other plots. This species is heavily loaded on the third principal component. We classified Area 16 as dry sand forest in contrast to Area 47, which is dry-mesic sand forest, but clearly there is heterogeneity in moisture within both areas that is apparent at the scale of our sampling but cannot be reflected at the scale of mappable units. The two second growth plots, SG2 and SG3 (in Area 48), are heavily dominated by *Juglans nigra* and contain few or no oaks of any species. Area 48, like Area 47, is dry-mesic sand forest. However, we graded 47 as C and 48 as D. Thus in the forest samples, PCA ordinates plots according to importance values of species that appear to reflect both soil moisture and disturbance history.

Figure 3 shows the tree species sorted by DBH size class. The abundance of small trees for most species suggests that recruitment is heavy, particularly of *Quercus velutina*, the predominant tree on the Depot. A possible exception is *Juglans nigra*. Nearly all trees of the species are between 10cm (3.9 in) and 30cm (11.8) DBH, but within this range all size classes are about equally represented. The trees of this species we sampled were exclusively in a second grown forest, so it is possible all the trees are relatively young and few seeds are being produced. The rarity of large trees of most species is probably a consequence of two factors. First, many of the present woods were once savanna and are now filling in following fire suppression. Second, large trees were probably cut for lumber and firewood.

## Vascular Plants

Fieldwork to compile a checklist of vascular plants at the Depot was conducted on all of the trips except for one. The results are presented in Appendices 2 and 3. Herbarium vouchers were made for all taxa observed, with specimens deposited in the herbarium of the Illinois Natural History Survey (ILLS). Since relatively little of our field work was conduced in the extensive floodplain forest and riverine systems, additional species are likely to occur in these habitats. Nomenclature principally follows Mohlenbrock (1986) or Gleason and Cronquist (1991).

A total of 617 taxa (species, subspecies, varieties, and forms) were found during 1996 (Appendices 2 and 3). In the tables, we also include *Polygala verticillata* (Polygalaceae), which we collected at the Depot in 1993 but did not encounter in 1996. Also included in the tables is *Orobanche fasciculata* (Orobanchaceae), which was last collected at the Depot in 1908 (Gleason 1910); however, abundant seemingly suitable habitat for this species still occurs at the Depot and the species could well still occur there. Gleason (1910) recorded several other plants that we did not observe in 1996, including: *Smilacina racemosa*, *Smilax ecirrhata*, *Petalostemum candidum*, *Asclepias exaltata*, *Scutellaria parvula/S. leonardii*, *Liatris cylindracea*, *Solidago missouriensis*, and *Parthenium integrifolium*. Of the total of 617 taxa, 480 (77.8%) are native species, 3 (0.5%) are questionably native, and 134 (21.7%) are introduced.

Using a database on these plant records, the following results were obtained. However, there are undoubtedly many instances where we simply did not note the occurrence of species occurring in particular habitats. Hence, these numbers may indicate relative trends and should not be used as exact figures.

207 are found in savannas (170 native)
225 in sand prairies (173 native)
349 in forest (310 native)
182 in floodplain forest (162 native)
198 in sand forest (178 native)

The vascular plants found at the Depot represent eight families of ferns and fern allies, two families of gymnosperms, 18 families of monocots, and 74 families of dicots. The most important families in terms of taxa present at the Depot are given below.

| Family | Total taxa | native taxa | introduced taxa |
|---|---|---|---|
| Poaceae | 80 | 54 | 26 |
| Asteraceae | 74 | 60 | 14 |
| Cyperaceae | 42 | 42 | 0 |
| Fabaceae | 30 | 18 | 12 |
| Rosaceae | 26 | 21 | 5 |
| Brassicaceae | 26 | 12 | 14 |
| Lamiaceae | 22 | 18 | 4 |
| Polygonaceae | 17 | 11 | 6 |
| Scrophulariaceae | 16 | 10 | 6 |
| Caryophyllaceae | 13 | 4 | 9 |
| Ranunculaceae | 13 | 13 | 0 |

The following are considered to be significant finds of this component of this project, and the locations of all new populations we observed are mapped on Map 2. See the following section for a separate discussion on Endangered, Threatened, and Rare Plants.

(1) In the course of our field work in 1996, we discovered three taxa of flowering plants that had not previously been reported for Illinois, all of them annuals. One, *Veronica dillenii* (Scrophulariaceae), is a native of Eurasia, and it has become locally established in eastern North America. It was first observed in the United States in southeastern Michigan, as noted by Pennell (1935). The other two taxa new to Illinois (see below) are members of the Brassicaceae (Mustard Family), and both native to North America. If these are indeed native to Illinois, then they could be considered for listing as endangered or threatened by the Illinois Endangered Species Protection Board. In addition, we also found the first occurrence in Illinois of one species of foliose lichen.

*Arabis* × *divaricarpa,* Purple Rock Cress — According to Rollins (1993), this taxon is of hybrid origin; it occurs from Labrador and Newfoundland south to New Jersey, west to northern Arizona and the Sierra Nevada of California, north to Alaska. Mulligan (1964) says that this species is extremely variable morphologically; plants can be diploid, triploid, or tetraploid; and since triploid plants set abundant seeds, they may be apomictic. The ploidy level of the plants at the SAD is unknown. Patman and Iltis (1961) report this taxon from numerous localities over much of Wisconsin. At the SAD, we found three localities, all in dry-mesic sand prairies, observing a total of about 20 plants.

*Draba nemorosa*, Whitlow Grass — Rollins (1993) indicates that this species is widespread in temperate western and northern North America and adventive eastward as far as Quebec. This species is rare, seemingly weedy, and doubtfully native in Wisconsin (Patman and Iltis 1961). At this point, we cannot judge whether it is native at the SAD. In 1996, we observed several plants growing along a roadside at the Depot.

*Xanthoparmelia vagans* — Foliose lichen. On open exposed sand with *Selaginella rupestris*. Thallus yellow-green. T26N R1E NW ¼ SE ¼ SW ¼ SE ¼ Sect. 13. Jo Daviess Co., Illinois. 19 June 1996. L. R. Phillippe, K. A. Kramer, and M. J. Moore 27530 (ILLS). Identified by J. W. Thompson, University of Wisconsin-Madison, who said that the thallus contained usnic acid, stictic acid, and salazinic acid, which are characteristic of this species. According to Hale (1990), this species occurs in Canada, western USA, Mexico, and Ecuador. This species has not previously been recorded from Illinois (Gerould Wilhelm, Conservation Design Forum, Inc., Naperville, Illinois, personal communication, 4 April 1997).

(2) *Bouteloua gracilis* (blue grama grass) had been reported from what is now the SAD by Pepoon in 1908 (Flora of Illinois Driftless Area. Sand flats, much less common than its relative *B. hirsuta*, 15 July 1908. H. S. Pepoon II 123, University of Illinois herbarium). This species was not observed by Gleason (1910), Bowles and Jones (1991, 1995) or others. On our last field trip to the Depot in 1996, we discovered this species growing in open dry sand prairie near a blowout contain a large population of *Artemisia campestris* subsp. *caudata*. There appeared to be just one clump of *B. gracilis* ca. 1m (3.3 ft) in diameter. It was found in the NE ¼ SW ¼ SE ¼ of Section 33, T26N, R2E. There is one other known herbarium specimen of *B. gracilis* from Illinois, collected by R. A. Evers in Henry County (sand prairie, Atkinson Lake Recreation Grounds, southwest of Atkinson, 21 September 1960, R. A. Evers 67824, deposited in the herbarium of the Illinois Natural History Survey). This population has not been relocated. This species is not currently listed as state endangered or threatened as it was not known to be extant in the state; however, it does qualify for such listing.

(3) *Equisetum pratense*, a state endangered species, was found for the first time at the Depot, growing in and at the edge of a dry sand forest (see below for more discussion).

## Endangered, Threatened, and Rare Plants

During 1996, searches for Endangered, Threatened, and Rare species of plants were concentrated in the southeastern third of the Savanna Army Depot (SAD), mostly outside the Restricted Area. However, as part of our surveys for natural plant communities, many locations of E, T, & R species were located throughout the Depot. On the accompanying map, we have marked the *new* locations of all E, T, & R species observed in 1996 (we usually did *not* mark previously known locations even if plants were observed in 1996). Brief discussions are given below for each species. We follow the names used in Herkert (1991, 1994) and the Illinois Endangered Species Protection Board (1994).

*Agropyron subsecundum*, Bearded Wheat Grass — State Endangered. This species is known from only one locality at the SAD, with two subpopulations divided by a road. An estimated 20-30 plants were observed in 1996. It was found in the SW ¼ SW ¼ NW ¼ of Section 19, T26N, R2E. No additional populations were located. [Note: the dot for this species on the January 1996 map is in the wrong place; it should be moved one road south.]

*Besseya bullii*, Kittentails — State Threatened. Previously, this species was known from only a few locations in the Depot, most notably in the cattle exclosure in Section 3; this population was observed in 1996. During 1996, we found several other locations of Kittentails along the same ridge system but farther northwest. The population in the NW ¼ of Section 33 contained an estimated 300 plants, many with fruits. Perhaps a dozen plants were also observed on the sand cliffs along the riverbank in Section 10. Gleason (1909) indicated that this was a characteristic species of the herbaceous layer under the oak forest on the River Dunes.

*Carex tonsa*, Shaved Sedge — State Endangered. This species and *Carex umbellata* are rather similar. All of the plants of this taxonomic complex observed during 1996 at SAD belong, in our judgment, to *Carex tonsa*. In making this determination, we looked at numerous specimens of both species from Illinois. We used a taxonomic identification key that will be used in Flora of North America, developed by William Crins, Ontario Ministry of Natural Resources, Huntsville. This species is extremely abundant throughout the Depot, occurring in sand blowouts and open sand prairies. It appears that cattle do not graze on this species except under extreme conditions, and hence grazing may have contributed to the present-day abundance of *C. tonsa* at the Depot. It is noteworthy that Gleason (1910) said that in 1908 *Carex tonsa* (he called these plants *C. umbellata*) rarely occurred outside of the *Panicum pseudopubescens* [= *P. villosissimum*] Association, being found only occasionally in the Bunch-grass Association and rarely in blowouts. The present-day widespread occurrence of this species at the Depot may well be the result of a shift towards the dry end of the dry to dry-mesic continuum caused by long-term cattle grazing.

*Bouteloua gracilis*, blue grama grass — Not listed. See above.

*Ceanothus herbaceus* (= *C. ovatus*), Redroot — State Endangered. A number of localities of this species were observed both previously and in 1996. Thus far we have observed 5 new locations. As pointed out by Shinners (1951) and reiterated by Brizicky (1964) and Voss (1985), the correct name for this plant is *C. herbaceus* Rafinesque. The binomial *C. ovatus* Desfontaine actually refers to a different species.

*Cyperus grayioides*, Gray's Umbrella Sedge — State Threatened. During 1996, we observed one new population in the SE ¼ of the NE ¼ of Section 24. This species is restricted to sand blowouts that occur within dry sand prairie and dry sand savanna.

*Equisetum pratense*, Meadow Horsetail — State Endangered. This State Endangered species had not previously been known from the SAD, although extant populations are known elsewhere in Jo Daviess County. One population was discovered in the NW ¼ NE ¼ of Section 10, T26N R1E. This is a rhizomatous species, and it was not possible to determine the number of individuals. However, we did observe *E. pratense* in four distinct places within a dry sand forest. Previously, only four populations were known from Illinois, all in Jo Daviess and Ogle counties (Herkert 1991).

*Geum triflorum*, Prairie Smoke — Not listed. While Prairie Smoke is not listed as Endangered or Threatened in Illinois, it is largely confined to the northern part of Illinois and is quite restricted. Hence, we have marked on the map locations of this species that we observed at the SAD.

*Hudsonia tomentosa*, False Heather — State Endangered. This species occurs somewhat frequently in sand blowouts in much of the SAD. During 1996, we observed 20 new locations.

*Mirabilis hirsuta*, Hairy Umbrella Wort — State Endangered. Prior to 1996 only one locality was known for this species at the SAD (Bowles and Jones 1991, 1995). An estimated 80 plants occurred at this site in 1996. Five additional localities were located in 1996, all of them with less than 20 plants. Thus far, this species appears to be limited to the edges of savannas and oak woodlands in the northern third of the SAD. This species was first observed to occur natively in Illinois in 1983 by Nÿboer and Schwegman on a sand hill prairie just north of Hanover Bluff Nature Preserve, also in Jo Daviess County (Schwegman 1991). Swink and Wilhelm (1994) report this species as naturalized in the greater Chicago area.

*Opuntia fragilis*, Fragile Prickly Pear — State Endangered. This western species is known in Illinois only from the SAD. We observed several previously known sites, and one new one in the SE ¼ of Section 14. There may be other populations as it is sometimes difficult to distinguish seedlings of *O. macrorhiza* from mature plants of *O. fragilis*. All plants of *O. fragilis* that we observed in 1996 were not healthy, and seemed to have a blackish infection. We did not observe any flowers in 1996. This species was observed in 1908 by Gleason in what is now the Depot (Gleason 1910), but with the construction of the Depot, this species was not seen again by botanists until 1984 (Schwegman 1991).

*Orobanche fasciculata*, Clustered Broomrape — State Endangered. This species was not observed in 1996, although extensive habitat exists. This species is an obligate root parasite, and Gleason (1910) noted that it occurred on *Artemisia caudata* [=*A. campestris* subsp. *caudata*] in what is now the SAD, and his excellent herbarium specimen has the plant of *O. fasciculata* attached to *A. caudata* (Sand dune in Station 3. Hanover, Jo Daviess County, Illinois, June 16, 1908, H. A. Gleason and F. C. Gates 2634, University of Illinois Herbarium).

*Polanisia jamesii*, James' Clammyweed — State Endangered. Previous studies have shown that James' Clammyweed is widespread in the SAD. During 1996, we observed large numbers (thousands) of this species in many sand blowouts and open sand prairies throughout much of the Depot. However, it is nevertheless rare elsewhere in Illinois, with extant populations known only in Jo Daviess and Carroll counties.

*Salvia azurea* subsp. *pitcheri*, Blue Sage — State Threatened. We observed both the usual blue flowered form (f. *pitcheri*) as well as one multi-stemmed plant of the rare white-flowered form (f. *alba*) at the SAD. There is only one large population at the SAD covering several acres. We collected the plant in SW ¼ SW ¼ NW ¼ of Section 19, T26N R2E, but the population extends beyond this. We conservatively estimate that there were more than 1,000 clumps in 1996; some plants were up to 2 m tall. This species was first observed at the Depot in 1989 by J. Schwegman and R. Nÿboer (Schwegman 1991).

*Talinum rugospermum*, Fameflower — Not listed, formerly a Category 2 Federal Candidate Species. Previously, Fameflower was known from 9 localities widely scattered in the Depot (Bowles and Jones 1991, 1995; Robertson et al. 1993). In 1996, we observed 15 additional sites, also widely scattered; relatively few individuals occur at each locality. Most often, this species is found around the top edges of blowouts, but it can occur on bare sand or in open sand prairie. This is a very difficult plant to visually spot, and undoubtedly more locations occur at the Depot.

## Additional Studies

In addition to the studies conducted under our contract with the Department of Natural Resources, we were asked during the contract period to do additional tasks, all based on our field work up to 1 August 1996. The first was to supply a map and brief descriptions of "sensitive natural areas", the second was to supply a map and text on the locations of new populations of endangered, threatened, and rare vascular plant species, and the third was to thoroughly survey a potential prison site for endangered, threatened, and rare vascular plant species. Reports of these were given previously to the Department of Natural Resources.

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**Table 1.** Average abundances of plants and bare ground for prairie and savanna samples at the Savanna Army Depot. Abundances were determined using the point-intercept method along four to 16 transects through each area, and the abundances were averaged among the transects. Within each plot, species are arranged in decreasing average abundance. See Table 2 for acronyms used for species. Natural community type and natural quality are indicated by a combination of which species are present, together with their abundance and conservatism. See text for more extensive discussion of each of these areas.

### A. Area 5. Dry-mesic Sand Prairie

| Species | Average Abundance |
|---|---|
| SCHSCO | 25.80 |
| POASP | 17.90 |
| SELRUP | 9.60 |
| SORNUT | 5.30 |
| AMBPSI | 4.00 |
| CARMUH | 3.10 |
| ACHMIL | 3.00 |
| ANDGER | 3.00 |
| PANVIL | 3.00 |
| KOEMAC | 2.60 |
| RUMACE | 2.00 |
| CARTON | 1.90 |
| PANOLI | 1.70 |
| PANVIR | 1.70 |
| SOLNEM | 1.70 |
| POTREC | 1.60 |
| PLAPAT | 1.50 |
| ARESER | 1.40 |
| ASTERI | 1.20 |
| CARPEN | 1.20 |
| CARSP | 1.10 |
| PANLIN | 1.10 |
| Bare Grnd | 1.00 |
| LEPSP | 0.80 |
| VULOCT | 0.80 |
| OPUMAC | 0.70 |
| PHYLON | 0.70 |
| SILANT | 0.60 |
| CYPSP | 0.50 |
| HELCAN | 0.50 |
| LITCAR | 0.40 |
| TRIPER | 0.40 |
| ASCVER | 0.30 |
| BOUHIR | 0.30 |
| LINCAN | 0.30 |
| VERARV | 0.30 |
| BROTEC | 0.20 |
| ERASPE | 0.20 |
| SPOCRY | 0.20 |
| TRAOHI | 0.20 |
| ANDOCC | 0.10 |
| ANTNEG | 0.10 |
| BESBUL | 0.10 |
| CERVUL | 0.10 |
| HIELON | 0.10 |
| KRIVIR | 0.10 |
| LEG2 | 0.10 |
| STISPA | 0.10 |
| VERSTR | 0.10 |

(Table 1 continued)

**B. Area 6. Dry-mesic Sand Prairie**

| Species | Average Abundance |
|---|---|
| POASP | 23.25 |
| SPOCRY | 10.25 |
| PLAPAT | 10.00 |
| AMBTRI | 8.75 |
| ARESER | 8.50 |
| POTARG | 7.00 |
| BROTEC | 6.00 |
| POTREC | 5.75 |
| ACHMIL | 5.50 |
| BRORAC | 4.75 |
| CENMAC | 4.50 |
| PANVIL | 1.75 |
| DIOTER | 1.25 |
| CYPSCH | 1.00 |
| LEPSP | 1.00 |
| PANLIN | 1.00 |
| UNK9 | 1.00 |
| ASCVER | 0.75 |
| Bare Grnd | 0.75 |
| CARMUH | 0.75 |
| PANOLI | 0.75 |
| VULOCT | 0.75 |
| LITCAR | 0.50 |
| LEG1 | 0.25 |
| MEDLUP | 0.25 |
| RUMACE | 0.25 |
| SOLNEM | 0.25 |
| VERARV | 0.25 |

**C. Area 7. Dry-mesic Sand Prairie**

| Species | Average Abundance |
|---|---|
| SORNUT | 20.17 |
| KOEMAC | 9.17 |
| CARPEN | 5.67 |
| CARMUH | 5.00 |
| PANVIR | 4.83 |
| CYPFIL | 4.50 |
| PANVIL | 3.67 |
| SCHSCO | 3.67 |
| AMBPSI | 3.33 |
| SPOCRY | 3.17 |
| ARISP | 2.67 |
| CARBRE | 2.67 |
| PANOLI | 1.67 |
| ASCVER | 1.50 |
| POASP | 1.33 |
| POTREC | 1.33 |
| Bare Grnd | 0.67 |
| LINCAN | 0.67 |
| OENRHO | 0.67 |
| PHYLON | 0.67 |
| UNK10 | 0.67 |
| CROGLA | 0.50 |
| OPUMAC | 0.50 |
| PANLIN | 0.50 |
| RHUARO | 0.50 |
| SAPOFF | 0.50 |
| BROTEC | 0.33 |
| CYPSCH | 0.33 |
| PLAPAT | 0.33 |
| RUMACE | 0.33 |
| STISPA | 0.33 |
| VULOCT | 0.33 |
| ACHMIL | 0.17 |
| CHASP | 0.17 |
| CYPFIL | 0.17 |
| ERISTR | 0.17 |
| SOLNEM | 0.17 |
| TRIPER | 0.17 |

(Table 1 continued)

**D. Area 13. Dry-mesic Sand Prairie**

| Species | Average Abundance |
|---|---|
| POASP | 21.50 |
| ANDGER | 12.00 |
| SCHSCO | 11.50 |
| OPUMAC | 6.50 |
| ARITUB | 4.50 |
| AMBPSI | 3.67 |
| KOEMAC | 3.50 |
| RUMACE | 2.67 |
| CARMUH | 2.33 |
| CARPEN | 2.33 |
| ERASPE | 2.17 |
| SORNUT | 1.67 |
| EUPCOR | 1.50 |
| CYPFIL | 1.33 |
| PANVIL | 1.33 |
| PANOLI | 0.83 |
| ARIBAS | 0.67 |
| Bare Grnd | 0.50 |
| CARTON | 0.50 |
| LEPCOG | 0.50 |
| ASCVER | 0.33 |
| LEPSP | 0.33 |
| OENRHO | 0.33 |
| POLART | 0.33 |
| SELRUP | 0.33 |
| CROGLA | 0.17 |
| POLPOL | 0.17 |
| SPOCRY | 0.17 |
| TRAOHI | 0.17 |

**E. Area 18. Dry Sand Prairie**

| Species | Average Abundance |
|---|---|
| ARIOLI | 7.50 |
| PANVIL | 7.00 |
| Bare Grnd | 6.75 |
| SELRUP | 6.75 |
| PANVIR | 6.50 |
| CYPSCH | 5.25 |
| AMBPSI | 4.75 |
| CYPFIL | 4.25 |
| VULOCT | 3.50 |
| BROTEC | 3.00 |
| TEPVIR | 3.00 |
| STISPA | 2.00 |
| CARTON | 1.75 |
| OENRHO | 1.75 |
| CARMUH | 1.25 |
| SCHSCO | 1.25 |
| SPOCRY | 1.25 |
| OPUMAC | 1.00 |
| POASP | 1.00 |
| BOUHIR | 0.75 |
| POLART | 0.75 |
| ARITUB | 0.50 |
| CARPEN | 0.50 |
| CYPFIL | 0.50 |
| ERASPE | 0.50 |
| KOEMAC | 0.50 |
| LEPDEN | 0.50 |
| PLAPAT | 0.50 |
| ARITUB | 0.25 |
| ASCVER | 0.25 |
| CROGLA | 0.25 |
| PASCIL | 0.25 |

(Table 1 continued)

**F. Area 19. Dry-mesic Sand Prairie**

| Species | Average Abundance |
|---|---|
| POASP | 10.63 |
| CARPEN | 8.81 |
| SCHSCO | 4.75 |
| TRIPUR | 3.63 |
| AMBPSI | 3.38 |
| STISPA | 2.38 |
| RHUARO | 2.25 |
| SPEINE | 1.63 |
| PLAPAT | 1.25 |
| PANVIL | 1.13 |
| ACHMIL | 0.88 |
| KOEMAC | 0.69 |
| PANOLI | 0.56 |
| PANDEP | 0.50 |
| ERASPE | 0.50 |
| VULOCT | 0.44 |
| SORNUT | 0.44 |
| CARMUH | 0.44 |
| ASCVER | 0.38 |
| FESC2 | 0.31 |
| BROTEC | 0.25 |
| POTREC | 0.25 |
| SILANT | 0.25 |
| POTARG | 0.19 |
| CYPSP | 0.19 |
| OPUMAC | 0.19 |
| OENRHO | 0.13 |
| ERISTR | 0.13 |
| ARESER | 0.13 |
| RUMACE | 0.13 |
| CERVUL | 0.13 |
| HEDHIS | 0.13 |
| CORVAR | 0.13 |
| PHYSP | 0.13 |
| UNK7 | 0.06 |
| UNK8 | 0.06 |
| CARBRE | 0.06 |
| ANDOCC | 0.06 |
| TRIPER | 0.06 |
| VERSP | 0.06 |
| UNK6 | 0.00 |

**G. Area 22. Dry Sand Savanna**

| Species | Average Abundance |
|---|---|
| POASP | 8.80 |
| TEPVIR | 8.20 |
| Bare Grnd | 7.80 |
| ARITUB | 7.00 |
| CARPEN | 6.20 |
| SELRUP | 4.60 |
| PANVIL | 4.00 |
| AMBPSI | 3.20 |
| ANDGER | 2.80 |
| CARMUH | 2.20 |
| LEPCOG | 2.20 |
| CYPFIL | 2.00 |
| RHUARO | 1.80 |
| PANVIR | 1.40 |
| RUMACE | 1.40 |
| ERASPE | 1.20 |
| STISPA | 1.00 |
| SPOCRY | 0.80 |
| CARTON | 0.60 |
| LITCAR | 0.60 |
| OPUMAC | 0.60 |
| EUPCOR | 0.40 |
| HEDHIS | 0.40 |
| LEPSP | 0.40 |
| MOLVER | 0.40 |
| OENRHO | 0.40 |
| BOUHIR | 0.20 |
| CYPSCH | 0.20 |
| KOEMAC | 0.20 |
| PANSP | 0.20 |
| POLART | 0.20 |

(Table 1 continued)

**H. Area 32. Dry-mesic Sand Prairie**

| Species | Average Abundance |
|---|---|
| CARPEN | 14.00 |
| Bare Grnd. | 10.75 |
| SELRUP | 7.08 |
| LIAASP | 5.50 |
| PANVIL | 3.94 |
| CYPSCH | 3.75 |
| TEPVIR | 3.06 |
| AMBPSI | 2.63 |
| KOEMAC | 2.13 |
| POASP | 2.00 |
| CARMUH | 1.75 |
| POTREC | 1.50 |
| RHUARO | 1.38 |
| STISPA | 1.33 |
| ARITUB | 1.13 |
| TRIPUR | 1.13 |
| BROTEC | 1.00 |
| OENRHO | 1.00 |
| PANVIR | 0.94 |
| OPUMAC | 0.75 |
| SILANT | 0.58 |
| ARALYR | 0.50 |
| BRORAC | 0.50 |
| LEPDEN | 0.50 |
| PLAPAT | 0.50 |
| SENPLA | 0.50 |
| BOUHIR | 0.42 |
| CEAHER | 0.38 |
| VULOCT | 0.38 |
| KRIVIR | 0.31 |
| ASCVER | 0.25 |
| CARBRE | 0.25 |
| CARTON | 0.25 |
| DRAREP | 0.25 |
| SISCAM | 0.25 |
| ERASPE | 0.17 |
| VIOPED | 0.17 |
| EQUFER | 0.13 |
| OPUFRA | 0.13 |
| PANLIN | 0.13 |
| PANOLI | 0.13 |
| RUMACE | 0.13 |
| PANDEP | 0.08 |
| CROGLA | 0.06 |
| GRASS2 | 0.06 |
| POLJAM | 0.06 |
| TALRUG | 0.06 |

**I. Area 43. Dry-mesic Sand Prairie**

| Species | Average Abundance |
|---|---|
| SPOCRY | 12.75 |
| POASP | 11.75 |
| VULOCT | 10.50 |
| Bare Grnd | 7.25 |
| KOEMAC | 7.25 |
| AMBPSI | 4.00 |
| PANVIL | 3.00 |
| PANVIR | 3.00 |
| PASCIL | 3.00 |
| CYPFIL | 2.75 |
| PLAPAT | 1.25 |
| RUMACE | 1.25 |
| LITCAR | 1.00 |
| POTREC | 1.00 |
| QUEVEL | 1.00 |
| STISPA | 1.00 |
| CARMUH | 0.75 |
| CARSCO | 0.50 |
| CONCAN | 0.50 |
| LEPCOG | 0.50 |
| MONPUN | 0.50 |
| SELRUP | 0.50 |
| ACHMIL | 0.25 |
| ARIBAS | 0.25 |
| CALTRI | 0.25 |
| CROGLA | 0.25 |
| RHUGLA | 0.25 |

(Table 1 continued)

**J. Area 55. Dry-mesic Sand Prairie**

| Species | Average Abundance |
|---|---|
| POASP | 17.60 |
| KOEMAC | 15.80 |
| SCHSCO | 11.00 |
| PANVIL | 9.60 |
| SORNUT | 8.80 |
| AMBPSI | 7.00 |
| BROINE | 6.00 |
| SPOCRY | 4.00 |
| Bare Grnd | 2.4 |
| CARMUH | 2.00 |
| PASCIL | 1.80 |
| SOLNEM | 1.60 |
| QUEVEL | 1.40 |
| PLAPAT | 1.00 |
| SOLSPE | 1.00 |
| CYPFIL | 0.80 |
| LITCAR | 0.80 |
| CARTON | 0.60 |
| CROGLA | 0.60 |
| CYPSCH | 0.60 |
| ANTPLA | 0.40 |
| ASCVER | 0.40 |
| COMUMB | 0.40 |
| LEPSP | 0.40 |
| MONPUN | 0.40 |
| ASTPIL | 0.20 |
| CROSAG | 0.20 |
| CYPSCH | 0.20 |
| HIELON | 0.20 |
| LESCAP | 0.20 |
| OENRHO | 0.20 |

**K. Area 38. Dry Sand Savanna**

| Species | Average Abundance |
|---|---|
| Bare Grnd | 12.17 |
| SELRUP | 6.17 |
| CARTON | 5.83 |
| TEPVIR | 5.50 |
| POASP | 4.00 |
| ARITUB | 3.83 |
| PANVIL | 3.17 |
| SCHSCO | 2.67 |
| CARMUH | 2.50 |
| AMBPSI | 2.33 |
| VULOCT | 2.00 |
| CYPFIL | 1.83 |
| ARIBAS | 1.67 |
| CARPEN | 1.67 |
| PANVIR | 1.17 |
| OENRHO | 1.00 |
| MOLVER | 0.83 |
| STISPA | 0.83 |
| LEPCOG | 0.67 |
| KOEMAC | 0.50 |
| RUMACE | 0.50 |
| CARBRE | 0.33 |
| HUDTOM | 0.33 |
| MONPUN | 0.33 |
| PLAPAT | 0.33 |
| TRIPUR | 0.33 |
| ARESER | 0.17 |
| ASCVER | 0.17 |
| CYPSCH | 0.17 |
| FROFLO | 0.17 |
| LEPSP | 0.17 |
| OPUMAC | 0.17 |
| PANLIN | 0.17 |
| POLTEN | 0.17 |
| POTARG | 0.17 |
| QUEVEL | 0.17 |
| RHUARO | 0.17 |
| SOLNEM | 0.17 |
| TALRUG | 0.17 |
| VIOPED | 0.17 |

**Table 2.** Explanation of acronyms used for the scientific names of plants in other tables.

| Genus | Species | abbrev. |
|---|---|---|
| *Achillea* | *millefolium* | ACHMIL |
| *Ambrosia* | *psilostachya* | AMBPSI |
| *Ambrosia* | *trifida* | AMBTRI |
| *Andropogon* | *gerardii* | ANDGER |
| *Androsace* | *occidentalis* | ANDOCC |
| *Antennaria* | *neglecta* | ANTNEG |
| *Antennaria* | *plantagini-folia* | ANTPLA |
| *Arabis* | *lyrata* | ARALYR |
| *Arenaria* | *serpyllifolia* | ARESER |
| *Aristida* | *basiramea* | ARIBAS |
| *Aristida* | *oligantha* | ARIOLI |
| *Aristida* | spp. | ARISP |
| *Aristida* | *tuberculosa* | ARITUB |
| *Asclepias* | *verticullata* | ASCVER |
| *Aster* | *ericoides* | ASTERI |
| *Aster* | *pilosus* | ASTPIL |
| Bare ground | | Bare Grnd |
| *Besseya* | *bullii* | BESBUL |
| *Bouteloua* | *hirsuta* | BOUHIR |
| *Bromus* | *inermis* | BROINE |
| *Bromus* | *racemosus* | BRORAC |
| *Bromus* | *tectorum* | BROTEC |
| *Callirhoë* | *triangulata* | CALTRI |
| *Carex* | *brevior* | CARBRE |
| *Carex* | *muhlenbergii* | CARMUH |
| *Carex* | *pensylvanica* | CARPEN |
| *Carex* | *scoparia* | CARSCO |
| *Carex* | spp. | CARSP |
| *Carex* | *tonsa* | CARTON |
| *Ceanothus* | *herbaceus* | CEAHER |
| *Centaurea* | *maculosa* | CENMAC |
| *Cerastium* | *vulgatum* | CERVUL |
| *Chamaesyce* | spp. | CHASP |
| *Comandra* | *umbellata* | COMUMB |
| *Conyza* | *canadensis* | CONCAN |
| *Coronilla* | *varia* | CORVAR |
| *Croton* | *glandulosus* | CROGLA |
| *Crotalaria* | *sagittalis* | CROSAG |
| *Cyperus* | *filiculmis* | CYPFIL |
| *Cyperus* | *schweinitzii* | CYPSCH |
| *Cyperus* | spp. | CYPSP |
| *Diodia* | *teres* | DIOTER |
| *Draba* | *reptans* | DRAREP |
| *Equisetum* | *ferrissii* | EQUFER |
| *Eragrostis* | *spectabilis* | ERASPE |
| *Erigeron* | *strigosus* | ERISTR |
| *Euphorbia* | *corrollata* | EUPCOR |
| Unknown Poaceae | | FESC2 |
| *Froelichia* | *floridana* | FROFLO |
| Unknown Poaceae | | GRASS2 |
| *Hedeoma* | *hispida* | HEDHIS |
| *Helianthemum* | *canadense* | HELCAN |
| *Hieracium* | *longipilum* | HIELON |
| *Hudsonia* | *tomentosa* | HUDTOM |
| *Koeleria* | *macrantha* | KOEMAC |
| *Krigia* | *virginica* | KRIVIR |
| Unknown Fabaceae | | LEG1 |
| Unknown Fabaceae | | LEG2 |
| *Leptoloma* | *cognatum* | LEPCOG |
| *Lepidium* | *densiflorum* | LEPDEN |
| *Lepidium* | spp. | LEPSP |
| *Lespedeza* | *capitata* | LESCAP |
| *Liatris* | *aspera* | LIAASP |
| *Linaria* | *canadensis* | LINCAN |
| *Lithospermum* | *caroliniense* | LITCAR |
| *Medicago* | *lupulina* | MEDLUP |
| *Mollugo* | *verticillatus* | MOLVER |
| *Monarda* | *punctata* | MONPUN |
| *Oenothera* | *rhombipetala* | OENRHO |
| *Opuntia* | *fragilis* | OPUFRA |
| *Opuntia* | *macrorhiza* | OPUMAC |
| *Panicum* | *depaupera-tum* | PANDEP |
| *Panicum* | *linearifolium* | PANLIN |
| *Panicum* | *oligosanthes* | PANOLI |
| *Panicum* | spp. | PANSP |
| *Panicum* | *villosissimum* | PANVIL |
| *Panicum* | *virgatum* | PANVIR |
| *Paspalum* | *ciliatifolium* | PASCIL |
| *Physalis* | *longifolia* | PHYLON |
| *Physalis* | spp. | PHYSP |
| *Plantago* | *patagonica* | PLAPAT |
| *Poa* | spp. | POASP |
| *Polygonella* | *articulata* | POLART |
| *Polansia* | *jamesii* | POLJAM |
| *Polygonella* | *polygama* | POLPOL |
| *Polygonum* | *tenue* | POLTEN |
| *Potentilla* | *argentea* | POTARG |
| *Potentilla* | *recta* | POTREC |
| *Quercus* | *velutina* | QUEVEL |
| *Rhus* | *aromatica* | RHUARO |
| *Rhus* | *glabra* | RHUGLA |
| *Rumex* | *acetosella* | RUMACE |
| *Saponaria* | *officinalis* | SAPOFF |
| *Schizachyrium* | *scoparium* | SCHSCO |
| *Selaginella* | *ruprestris* | SELRUP |
| *Senecio* | *plattensis* | SENPLA |
| *Silene* | *antirrhina* | SILANT |
| *Sisyrinchium* | *campestre* | SISCAM |
| *Solidago* | *nemoralis* | SOLNEM |
| *Solidago* | *speciosa* | SOLSPE |
| *Sorghastrum* | *nutans* | SORNUT |
| *Spermolepis* | *inermis* | SPEINE |
| *Sporobolus* | *cryptandrus* | SPOCRY |
| *Stipa* | *spartea* | STISPA |
| *Talinum* | *rugospermum* | TALRUG |
| *Tephrosia* | *virginiana* | TEPVIR |
| *Tradescantia* | *ohioensis* | TRAOHI |
| *Triodanis* | *perfoliata* | TRIPER |
| *Triplasis* | *purpurea* | TRIPUR |
| Unknown species | | UNK6 |
| Unknown species | | UNK7 |
| Unknown species | | UNK8 |
| Unknown species | | UNK9 |
| Unknown species | | UNK10 |
| *Veronica* | *arvensis* | VERARV |
| *Verbena* | spp | VERSP |
| *Verbena* | *stricta* | VERSTR |
| *Viola* | *pedata* | VIOPED |
| *Vulpia* | *octoflora* | VULOCT |

**Table 3.** Density of trees in each 625m$^2$ forest quadrat at the Savanna Army Depot. Quadrats abbreviated as in Figure 3.

| | RD1 | RD2 | RD3 | RD4 | NW1 | NW2 | NW3 | NW4 | SG1 | SG2 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Acer saccharinum* | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Betula nigra* | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| *Carya cordiformis* | 0 | 0 | 2 | 5 | 2 | 0 | 3 | 4 | 3 | 2 |
| *Celtis occidentalis* | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 4 | 0 |
| *Fraxinus pennsylvanica* | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Juglans cineria* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| *Juglans nigra* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 18 |
| *Juniperus virginica* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| *Morus alba* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| *Prunus serotina* | 1 | 0 | 3 | 4 | 1 | 3 | 3 | 2 | 0 | 0 |
| *Quercus alba* | 0 | 0 | 6 | 11 | 4 | 2 | 8 | 9 | 0 | 0 |
| *Quercus rubra* | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| *Quercus velutina* | 54 | 45 | 9 | 8 | 1 | 9 | 0 | 5 | 3 | 0 |
| *Robinia pseudo-acacia* | 0 | 0 | 0 | 0 | 3 | 17 | 0 | 0 | 0 | 0 |
| *Tilia americana* | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| *Ulmus americana* | 0 | 0 | 1 | 2 | 3 | 0 | 2 | 0 | 0 | 0 |
| *Ulmus rubra* | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 2 |

**Table 4.** Basal area ($m^2$) of trees in each $625m^2$ forest quadrat at the Savanna Army Depot. Quadrats abbreviated as in Figure 3.

| | RD1 | RD2 | RD3 | RD4 | NW1 | NW2 | NW3 | NW4 | SG1 | SG2 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Acer saccharinum* | 0 | 0 | 0.15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Betula nigra* | 0 | 0 | 0.06 | 0 | 0 | 0 | 0 | 0 | 0 | 0.06 |
| *Carya cordiformis* | 0 | 0 | 0.04 | 0.11 | 0.02 | 0 | 0.03 | 0.05 | 0.03 | 0.06 |
| *Celtis occidentalis* | 0 | 0 | 0 | 0 | 0.04 | 0 | 0 | 0 | 0.05 | 0 |
| *Fraxinus pennsylvanica* | 0.01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Juglans cineria* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.01 | 0 | 0 |
| *Juglans nigra* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.66 | 0.75 |
| *Juniperus virginica* | 0 | 0 | 0 | 0 | 0.16 | 0 | 0 | 0 | 0.18 | 0 |
| *Morus alba* | 0 | 0 | 0 | 0 | 0.01 | 0 | 0 | 0 | 0 | 0 |
| *Prunus serotina* | 0.01 | 0 | 0.06 | 0.29 | 0.02 | 0.05 | 0.04 | 0.02 | 0 | 0 |
| *Quercus alba* | 0 | 0 | 0.18 | 0.34 | 0.66 | 0.08 | 1.47 | 1.29 | 0 | 0 |
| *Quercus rubra* | 0 | 0 | 0 | 0 | 0 | 0 | 0.02 | 0.01 | 0 | 0 |
| *Quercus velutina* | 1.21 | 1.75 | 0.67 | 0.33 | 0.18 | 1.28 | 0 | 0.90 | 0.17 | 0 |
| *Robinia pseudoacacia* | 0 | 0 | 0 | 0 | 0.40 | 0.24 | 0 | 0 | 0 | 0 |
| *Tilia americana* | 0 | 0 | 0 | 0 | 0.09 | 0 | 0.02 | 0 | 0 | 0 |
| *Ulmus americana* | 0 | 0 | 0 | 0.06 | 0.07 | 0 | 0.03 | 0 | 0 | 0 |
| *Ulmus rubra* | 0 | 0 | 0 | 0 | 0.01 | 0 | 0 | 0 | 0.01 | 0.03 |

**Table 5.** IV200 of trees in each 625m$^2$ forest quadrat at the Savanna Army Depot. Quadrats abbreviated as in Figure 3.

| | RD1 | RD2 | RD3 | RD4 | NW1 | NW2 | NW3 | NW4 | SG1 | SG2 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Acer saccharinum* | 0 | 0 | 24.79 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Betula nigra* | 0 | 0 | 9.46 | 0 | 0 | 0 | 0 | 0 | 0 | 11.38 |
| *Carya cordiformis* | 0 | 0 | 11.84 | 26.14 | 10.85 | 0 | 18.34 | 20.58 | 13.73 | 15.79 |
| *Celtis occidentalis* | 0 | 0 | 0 | 0 | 16.62 | 0 | 0 | 0 | 19.55 | 0 |
| *Fraxinus pennsylvanica* | 2.49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| *Juglans cineria* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4.89 | 0 | 0 |
| *Juglans nigra* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 115.65 | 160.88 |
| *Juniperus virginica* | 0 | 0 | 0 | 0 | 14.19 | 0 | 0 | 0 | 19.82 | 0 |
| *Morus alba* | 0 | 0 | 0 | 0 | 5.44 | 0 | 0 | 0 | 0 | 0 |
| *Prunus serotina* | 2.69 | 0 | 17.10 | 38.79 | 5.90 | 12.68 | 19.22 | 10.17 | 0 | 0 |
| *Quercus alba* | 0 | 0 | 39.68 | 66.89 | 59.09 | 11.01 | 135.98 | 97.31 | 0 | 0 |
| *Quercus rubra* | 0 | 0 | 0 | 0 | 0 | 0 | 6.67 | 5.02 | 0 | 0 |
| *Quercus velutina* | 194.82 | 200.00 | 93.12 | 55.96 | 15.50 | 106.66 | 0 | 62.02 | 26.72 | 0 |
| *Robinia pseudo-acacia* | 0 | 0 | 0 | 0 | 38.43 | 69.65 | 0 | 0 | 0 | 0 |
| *Tilia americana* | 0 | 0 | 0 | 0 | 9.89 | 0 | 6.65 | 0 | 0 | 0 |
| *Ulmus americana* | 0 | 0 | 4.00 | 12.22 | 18.56 | 0 | 13.14 | 0 | 0 | 0 |
| *Ulmus rubra* | 0 | 0 | 0 | 0 | 5.54 | 0 | 0 | 0 | 4.53 | 11.95 |

**Table 6.** Principal component loadings and variance explained by each component for SAD prairie and savanna transects. See Table 2 for explanation of acronyms used for plant species. Species with large positive or negative loadings are very important in determining the position of samples along a component axis, and species with small loadings are relatively unimportant. Species sharing the same sign vary together along the component, whereas those with different signs vary in opposite directions. For example, *Oenothera rhombipetala* (OENRHO) and bare ground increase together, but *Achillea millefolium* (ACHMIL) decreases as these increase in a sample.

| Plant Species | Principal Component | |
|---|---|---|
| | 1 | 2 |
| ACHMIL | -0.886 | 0.371 |
| AMBPSI | 0.464 | -0.483 |
| ARESER | -0.815 | 0.467 |
| ARIBAS | 0.526 | 0.100 |
| ARITUB | 0.442 | 0.249 |
| ASCVER | -0.348 | -0.474 |
| BOUHIR | 0.519 | 0.473 |
| BROTEC | -0.486 | 0.604 |
| CARBRE | 0.082 | -0.562 |
| CARMUH | 0.299 | -0.495 |
| CARPEN | 0.206 | 0.086 |
| CARTON | 0.406 | 0.259 |
| CROGLA | 0.143 | -0.726 |
| CYPFIL | 0.563 | -0.240 |
| CYPSCH | 0.422 | 0.465 |
| ERASPE | 0.163 | -0.051 |
| KOEMAC | -0.039 | -0.778 |
| LEPCOG | 0.359 | 0.224 |
| LEPSP | -0.399 | 0.656 |
| LITCAR | -0.259 | -0.015 |
| OENRHO | 0.760 | 0.329 |
| OPUMAC | 0.065 | -0.181 |
| PANLIN | -0.724 | 0.163 |
| PANOLI | -0.495 | -0.480 |
| PANVIL | 0.534 | -0.057 |
| PANVIR | 0.514 | -0.052 |
| PLAPAT | -0.832 | 0.431 |
| POASP | -0.716 | -0.053 |
| POTREC | -0.797 | 0.398 |
| RHUARO | 0.122 | 0.070 |
| RUMACE | -0.039 | -0.147 |
| SCHSCO | -0.253 | -0.440 |
| SELRUP | 0.529 | 0.543 |
| SOLNEM | -0.304 | -0.321 |
| SORNUT | -0.074 | -0.804 |
| SPOCRY | -0.479 | 0.037 |
| STISPA | 0.310 | 0.177 |
| TEPVIR | 0.621 | 0.506 |
| VULOCT | 0.124 | 0.053 |
| Bare Grnd | 0.654 | 0.509 |
| Variance explained | 23.3% | 16.4% |

**Table 7.** Principal component loadings and variance explained by each component for SAD forest quadrats. See Table 6 for guidelines on interpreting the loadings

| Plant Species | Principal Component | |
|---|---|---|
| | 1 | 2 |
| *Acer saccharinum* | -0.917 | 0.672 |
| *Betula nigra* | 1.400 | -1.862 |
| *Carya cordiformis* | 6.563 | 3.389 |
| *Celtis occidentalis* | 2.899 | -1.525 |
| *Fraxinus pennsylvanica* | -0.418 | -0.136 |
| *Juglans cineria* | 0.079 | 0.493 |
| *Juglans nigra* | 36.052 | -46.282 |
| *Juniperus virginica* | 2.781 | -1.744 |
| *Morus alba* | 0.324 | 0.404 |
| *Prunus serotina* | 1.157 | 7.860 |
| *Quercus alba* | 17.552 | 43.071 |
| *Quercus rubra* | 0.746 | 1.624 |
| *Quercus velutina* | -72.333 | -12.307 |
| *Robinia pseudoacacia* | -2.212 | 2.328 |
| *Tilia americana* | 1.252 | 1.850 |
| *Ulmus americana* | 2.464 | 4.619 |
| *Ulmus rubra* | 2.611 | -2.454 |
| Variance explained | 56.0% | 34.6% |

**Table 8.** Natural Communites at the Savanna Army Depot with Acreages and Grades

SORTED BY AREA NUMBER

| Area No. | Acres | Natural Community | Grade |
|---|---|---|---|
| 1 | 621.5 | wet and wet-mesic floodplain forest | C |
| 2 | 143.8 | dry sand forest (river dune) | C* |
| 3 | 28.5 | cultural | E |
| 4 | 11.5 | dry sand savanna | C* |
| 5 | 40.6 | dry-mesic sand prairie | C* |
| 6 | 258.6 | dry-mesic sand prairie | D |
| 7 | 98.8 | dry-mesic sand prairie | C* |
| 8 | 54.0 | dry sand forest | D |
| 9 | 29.6 | dry sand forest (river dune) | D |
| 10 | 11.3 | dry-mesic sand prairie | C† |
| 11 | 379.7 | cultural | E |
| 12 | 7.0 | cultural, plantation | E |
| 13 | 55.5 | dry-mesic sand prairie | C |
| 14 | 24.9 | dry-mesic sand forest | D |
| 15 | — | not used | — |
| 16 | 71.3 | dry sand forest (river dune) | C* |
| 17 | 435.5 | dry-mesic sand prairie | D |
| 18 | 143.5 | dry sand prairie | C* |
| 19 | 3,017.1 | dry-mesic sand prairie | C |
| 20 | 174.2 | dry-mesic sand prairie | C† |
| 21 | 537.0 | dry-mesic sand prairie | C |
| 22 | 33.3 | dry sand savanna | C* |
| 23 | 12.1 | wet-mesic floodplain forest | D |
| 24 | 118.2 | dry-mesic sand savanna | C* |
| 25 | 50.3 | dry-mesic sand savanna | D |
| 26 | 170.1 | dry-mesic sand prairie | D |
| 27 | 42.2 | wet-mesic floodplain forest | D |
| 28 | 39.7 | pond | |
| 29 | 34.9 | dry-mesic sand prairie | C† |
| 30 | 20.8 | dry-mesic sand prairie | E |
| 31 | 17.7 | wet-mesic floodplain forest | D |
| 32 | 151.2 | dry-mesic sand prairie | C* |
| 33 | 4,931.2 | wet and wet-mesic floodplain forest | C |
| 34 | 53.0 | dry-mesic sand forest | D |
| 35 | 149.6 | dry-mesic sand prairie | D |
| 36 | 77.2 | dry-mesic sand prairie | C |
| 37 | 221.7 | dry-mesic sand prairie | D |
| 38 | 165.5 | dry-mesic sand savanna | C (some C*) |
| 39 | 35.1 | dry-mesic sand forest | D |
| 40 | 46.7 | dry-mesic sand prairie | D |
| 41 | 52.3 | dry-mesic sand prairie | C† |
| 42 | 63.9 | dry-mesic sand forest | D |
| 43 | 45.9 | dry-mesic sand prairie | C† |
| 44 | 12.0 | wet-mesic floodplain forest | C |
| 45 | 173.1 | dry-mesic sand forest | D |
| 46 | 41.3 | wet-mesic floodplain forest | D |
| 47 | 39.3 | dry-mesic sand forest | C |
| 48 | 106.7 | dry-mesic sand forest | D |
| 49 | 32.2 | dry-mesic sand forest | C |

Table 8 (continued)

| | | | |
|---|---|---|---|
| 50 | 930.8 | open water | |
| 51 | 79.3 | dry-mesic sand forest | D |
| 52 | 20.6 | cultural | E |
| 53 | 16.6 | dry-mesic sand forest | D |
| 54 | 36.4 | dry-mesic sand forest | C |
| 55 | 41.9 | dry-mesic sand prairie | C |
| 56 | 18.4 | dry-mesic sand prairie | E |
| 57 | 17.7 | wet-mesic floodplain forest | D |
| 58 | 40.8 | dry sand savanna | C |
| 59 | 16.3 | mesic floodplain forest | C |
| 60 | 3.7 | sand blowout | not rated |
| 61 | 23.7 | cultural plantation | E |
| 62 | 41.4 | dry-mesic sand prairie | C† |

SORTED BY NATURAL COMMUNITY

| Area No. | Acres | Natural Community | Grade |
|---|---|---|---|
| 3 | 28.5 | cultural | E |
| 11 | 379.7 | cultural | E |
| 52 | 20.6 | cultural | E |
| 12 | 7.0 | cultural, plantation | E |
| 61 | 23.7 | cultural, plantation | E |
| 8 | 54.0 | dry sand forest | D |
| 2 | 143.8 | dry sand forest (river dune) | C* |
| 9 | 29.6 | dry sand forest (river dune) | D |
| 16 | 71.3 | dry sand forest (river dune) | C* |
| 18 | 143.5 | dry sand prairie | C* |
| 4 | 11.5 | dry sand savanna | C* |
| 22 | 33.3 | dry sand savanna | C* |
| 58 | 40.8 | dry sand savanna | C |
| 14 | 24.9 | dry-mesic sand forest | D |
| 34 | 53.0 | dry-mesic sand forest | D |
| 39 | 35.1 | dry-mesic sand forest | D |
| 42 | 63.9 | dry-mesic sand forest | D |
| 45 | 173.1 | dry-mesic sand forest | D |
| 47 | 39.3 | dry-mesic sand forest | C |
| 48 | 106.7 | dry-mesic sand forest | D |
| 49 | 32.2 | dry-mesic sand forest | C |
| 51 | 79.3 | dry-mesic sand forest | D |
| 53 | 16.6 | dry-mesic sand forest | D |
| 54 | 36.4 | dry-mesic sand forest | C |
| 5 | 40.6 | dry-mesic sand prairie | C* |
| 6 | 258.6 | dry-mesic sand prairie | D |
| 7 | 98.8 | dry-mesic sand prairie | C* |
| 10 | 11.3 | dry-mesic sand prairie | C† |
| 13 | 55.5 | dry-mesic sand prairie | C |
| 17 | 435.5 | dry-mesic sand prairie | D |
| 19 | 3,017.1 | dry-mesic sand prairie | C |
| 20 | 174.2 | dry-mesic sand prairie | C† |
| 21 | 537.0 | dry-mesic sand prairie | C |
| 26 | 170.1 | dry-mesic sand prairie | D |
| 29 | 34.9 | dry-mesic sand prairie | C† |

Table 8 (continued)

| | | | |
|---|---|---|---|
| 30 | 20.8 | dry-mesic sand prairie | E |
| 32 | 151.2 | dry-mesic sand prairie | C* |
| 35 | 149.6 | dry-mesic sand prairie | D |
| 36 | 77.2 | dry-mesic sand prairie | C |
| 37 | 221.7 | dry-mesic sand prairie | D |
| 40 | 46.7 | dry-mesic sand prairie | D |
| 41 | 52.3 | dry-mesic sand prairie | C† |
| 43 | 45.9 | dry-mesic sand prairie | C† |
| 55 | 41.9 | dry-mesic sand prairie | C |
| 56 | 18.4 | dry-mesic sand prairie | E |
| 62 | 41.4 | dry-mesic sand prairie | C† |
| 24 | 118.2 | dry-mesic sand savanna | C* |
| 25 | 50.3 | dry-mesic sand savanna | D |
| 38 | 165.5 | dry-mesic sand savanna | C (some C*) |
| 59 | 16.3 | mesic floodplain forest | C |
| 50 | 930.8 | open water | |
| 28 | 39.7 | pond | |
| 60 | 3.7 | sand blowout | not rated |
| 1 | 621.5 | wet and wet-mesic floodplain forest | C |
| 33 | 4,931.2 | wet and wet-mesic floodplain forest | C |
| 23 | 12.1 | wet-mesic floodplain forest | D |
| 27 | 42.2 | wet-mesic floodplain forest | D |
| 31 | 17.7 | wet-mesic floodplain forest | D |
| 44 | 12.0 | wet-mesic floodplain forest | C |
| 46 | 41.3 | wet-mesic floodplain forest | D |
| 57 | 17.7 | wet-mesic floodplain forest | D |

**Figure 1**. Principal Components Analysis for the 11 prairie and savanna sites sampled, based on relative abundances of the 39 taxa found in at least four sites, plus bare ground. The first two components accounted for 50% of the variation in the original data. The sites are: Area 5; Area 6; Area 7; Area 13; Area 18; Area 19; Area 22; Area 32; Area 38; Area 43; and Area 55. The vectors for the 11 taxa, plus bare ground, that received high loadings on at least one of the first two components are labeled with the following abbreviations: ARESER = *Arenaria serpyllifolia*; ACHMIL = *Achillea millefolium*; BG = bare ground; CROCLA = *Croton glandulosus*; KOEMAC = *Koeleria macrantha*; LEPSPP = *Lepidium* spp.; OENRHO = *Oenothera rhombipetala*; PANLIN = *Panicum linearifolium*; PLAPAT = *Plantago patagonica*; POASPP = *Poa* spp.; POTRET = *Potentilla recta*; and SORNUT = *Sorghastrum nutans*.

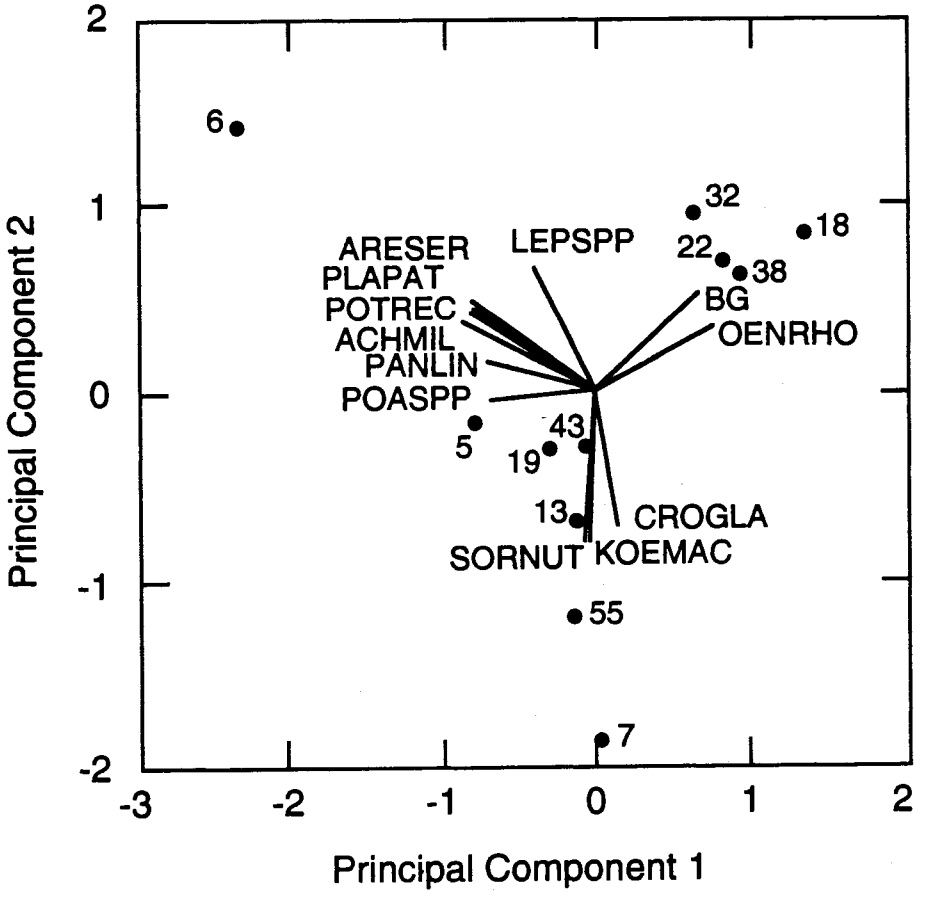


**Figure 2**. Principal Components Analysis for the 10 forest plots sampled, based on IV200 of the 17 tree species (DBH = 5cm > found. The first two components accounted for 90 % of the variation in the original data. The sites are: RD–River Dunes (Area 16); NW–Northern Woods (Area 47), and SG–Second Growth Woods (Area 48). The vectors for the three species that received high loadings on at least one of the first two components are also shown.

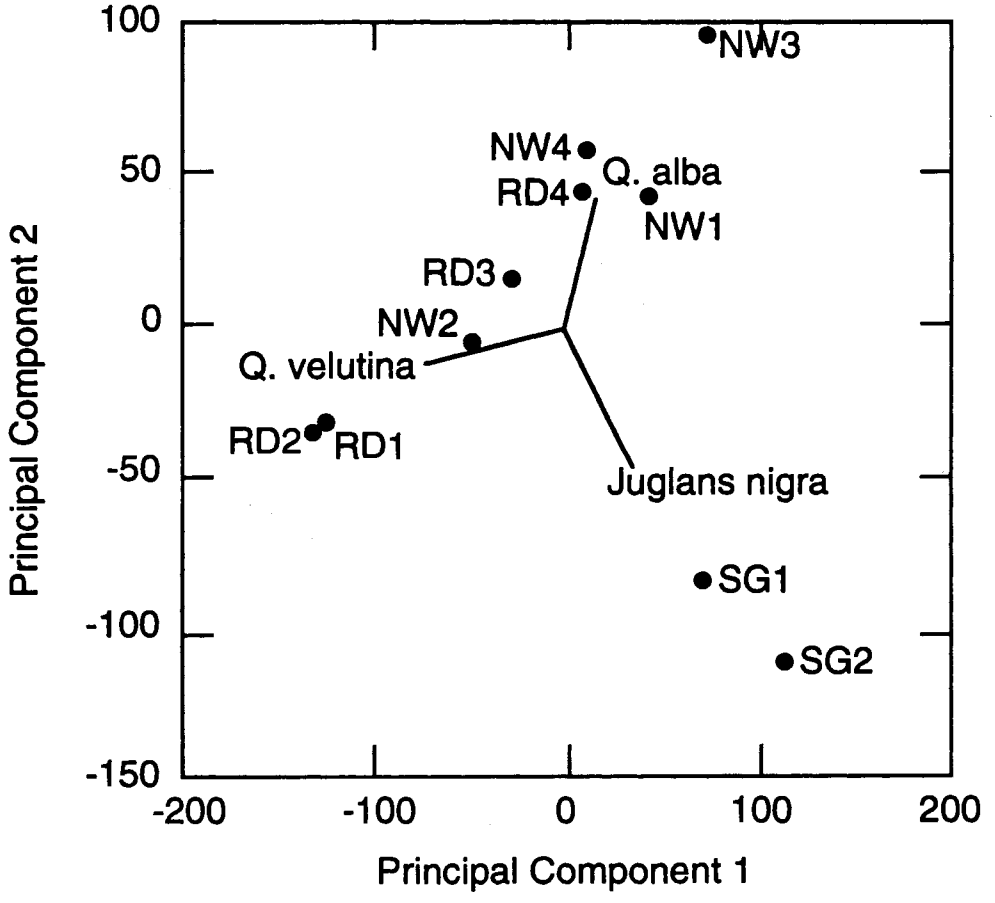
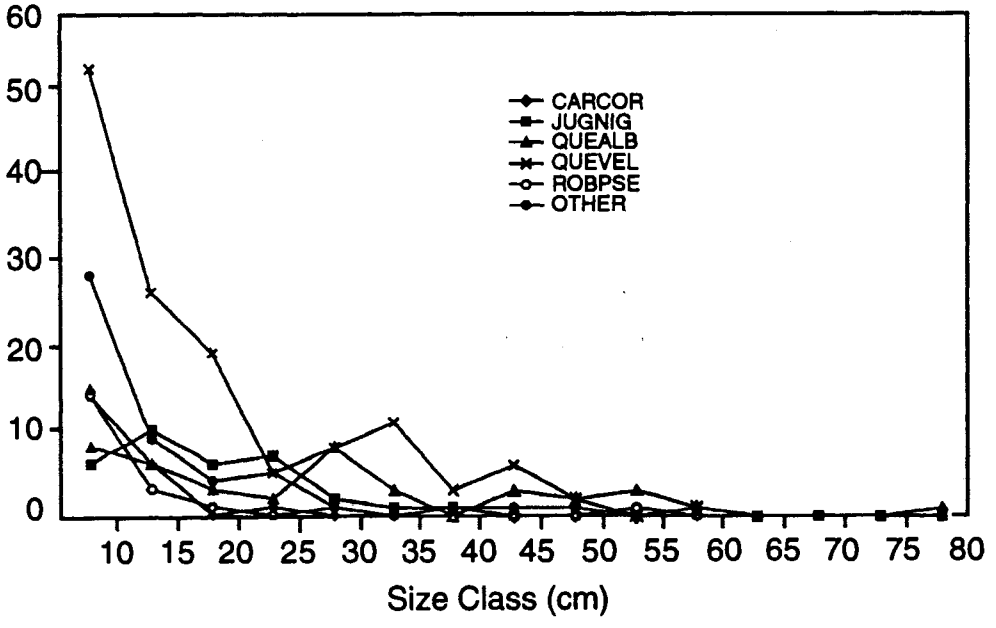


**Figure 3**. Plot numbers of trees in 5cm DBH size classes for the 10 sampled forest plots. Species abbreviations are: CARCOR = *Carya cordiformis*; JUGNIG = *Juglans nigra*; QUEALB = *Quercus alba*; QUEVEL = *Quercus velutina*; and ROBPSE = *Robinia pseudoacacia*. The remaining 12 species are combined as OTHER.



**Appendix 1**. Days spent in Field. During the 1996 growing season, we spent the following days conducting field work at the Savanna Army Depot by L. R. Phillippe, G. A. Levin, K. R. Robertson, K. A. Kramer, and M. J. Moore.

May 8–10 (Phillippe, Levin, Robertson)
May 20–22 (Phillippe, Levin, Robertson, Kramer, Moore)
May 28–30 (Robertson, Kramer, Moore)
June 4–6 (Phillippe, Levin, Moore)
June 18–20 (Phillippe, Kramer, Moore)
July 8–10 (Phillippe, Levin, Robertson, Moore)
July 16–18 (Phillippe, Robertson, Moore)
July 30–August 1 (Phillippe, Robertson, Moore)
August 21–23 (Phillippe, Levin, Moore, Handel)
September 9–11 (Phillippe, Kramer, Taft, Nÿboer, Anderson)
September 24–26 (Phillippe, Kramer)
October 16–18 (Phillippe, Robertson)
October 22–24 (Phillippe, Robertson).

**Appendix 2.** Annotated List of Vascular Plants at the Savanna Army Depot. Arranged alphabetically by scientific name. This list includes only species we observed during 1996, except for *Polygala verticillata*, which was collected in 1993 and *Orobanche fasciculata* (Orobanchaceae), which was last collected at the Depot in 1908 although suitable habitat is still extant. Under "Scientific Names", the authorities are omitted for brevity; they are included on the voucher specimens cited in Table 2. Under "E/T", E = State Endangered, T = State Threatened, FCC = former Federal Candidate Category 2, ND = Newly Discovered in Illinois and likely to qualify for listing as a state endangered species.

| Scientific Name | Common Name | Native? | Frequency and Habitat | E/T |
|---|---|---|---|---|
| *Acalypha rhomboidea* | Three-seeded Mercury | native | Occasional in sand forest and in wet-mesic floodplain forest | — |
| *Acer negundo* | Boxelder | native | Occasional in sand forest, sand savanna, pastureland, and wet-mesic floodplain forest; infrequent in sand prairie | — |
| *Acer saccharinum* | Silver maple | native | Abundant in wet-mesic floodplain forest | — |
| *Acer saccharum* | Sugar Maple | native | Occasional in sand forest | — |
| *Achillea millefolium* | Yarrow | introd. | Frequent in sand prairie and sand savanna; occasional in pastureland | — |
| *Adiantum pedatum* | Maidenhair Fern | native | Infrequent in sand forest | — |
| *Agalinis tenuifolia* | Common Agalinis | native | Infrequent in wet-mesic floodplain forest | — |
| *Agastache nepetoides* | Yellow Giant Hyssop | native | Occasional in sand savanna | — |
| *Agrimonia gryposepala* | Tall Agrimony | native | Occasional in sand forest and sand savanna | — |
| *Agrimonia pubescens* | Soft Agrimony | native | Occasional in sand forest | — |
| *Agropyron repens* f. *aristatum* | Quack Grass | introd. | Occasional in sand prairie | — |
| *Agropyron repens* f. *repens* | Quack Grass | introd. | Occasional in sand prairie | — |
| *Agropyron smithii* | Western Wheat Grass | introd. | Occasional in developed land, sand prairie and sand savanna | — |
| *Agropyron subsecundum* | Bearded Wheat Grass | native | Infrequent in sand savanna | E |
| *Agrostis gigantea* | Redtop | introd. | Infrequent in developed land and sand prairie | — |
| *Agrostis hyemalis* | Bent Grass | native | Occasional in developed land, sand prairie, and sand savanna | — |
| *Alisma plantago-aquatica* var. *parviflorum* | Small-flowered Water Plantain | native | Occasional in wet-mesic floodplain forest | — |
| *Alliaria petiolata* | Garlic Mustard | introd. | Frequent to abundant in sand forest | — |
| *Allium canadense* | Wild Onion | native | Occasional in wet-mesic floodplain forest | — |
| *Alopecurus carolinianus* | Common Foxtail | native | Occasional in disturbed sand pond | — |
| *Alyssum alyssoides* | Pale Allysum | introd. | Occasional in developed land and sand prairie | — |
| *Amaranthus rudis* | Water Hemp | native | Frequent in wet-mesic floodplain forest | — |
| *Amaranthus spinosus* | Spiny Amaranth | introd. | Rare in wet-mesic floodplain forest | — |
| *Amaranthus tuberculatus* | Amaranth | introd. | Frequent in wet-mesic floodplain forest | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Ambrosia artemisiifolia* | Common Ragweed | native? | Infrequent in developed land and sand prairie | — |
| *Ambrosia psilostachya* | Western Ragweed | native | Common in sand prairie | |
| *Ambrosia trifida* | Giant Ragweed | native | Occasional in wet-mesic floodplain forest | — |
| *Ammannia coccinea* | Tooth-cup | native | Occasional in wet-mesic floodplain forest | — |
| *Amorpha canescens* | Leadplant | native | Occasional in sand prairie | — |
| *Amorpha fruticosa* | False Indigo | native | Occasional in wet-mesic bottomland forest | — |
| *Amphicarpa bracteata* | Hog-peanut | native | Occasional in wet-mesic floodplain forest; infrequent in sand forest | — |
| *Andropogon gerardii* | Big Bluestem | native | Occasional in sand prairie | — |
| *Androsace occidentalis* | Rock Jasmine | native | Frequent in sand prairie and sand savanna | — |
| *Anemone canadensis* | Meadow Anemone | native | Frequent in border with sand forest and wet-mesic floodplain forest | — |
| *Anemone caroliniana* | Carolina Anemone | native | Infrequent in sand prairie | — |
| *Anemone cylindrica* | Thimbleweed | native | Occasional in sand forest | — |
| *Anemone quinquefolia* | Wood Anemone | native | Infrequent in sand forest | — |
| *Anemone virginiana* | Tall Anemone | native | Occasional in wet-mesic floodplain forest | — |
| *Antennaria neglecta* | Cat's Foot | native | Occasional in sand prairie and sand savanna | — |
| *Antennaria plantaginifolia* | Pussy Toes | native | Infrequent in sand savanna | — |
| *Apios americana* | Common Ground-nut | native | Infrequent in wet-mesic floodplain forest | — |
| *Apocynum sibiricum* | Creeping Dogbane | native | Infrequent in wet-mesic floodplain forest | — |
| *Aquilegia canadensis* | Wild Columbine | native | Occasional in sand forest | — |
| *Arabis canadensis* | Sicklepod | native | Infrequent in sand forest | — |
| *Arabis glabra* | Tower Mustard | native | Rare in sand prairie | — |
| *Arabis lyrata* | Sand Cress | native | Common in sand prairie and sand savanna | — |
| *Arabis* × *divaricarpa* | Purple Rock Cress | native | Infrequent in sand prairie | ND |
| *Aralia nudicaulis* | Wild Sarsaparilla | native | Infrequent in sand forest | — |
| *Arctium lappa* | Great Burdock | introd. | Infrequent in sand savanna | — |
| *Arctium minus* | Common Burdock | introd. | Occasional in disturbed sand savanna | — |
| *Arenaria serpyllifolia* | Thyme-leaved Sandwort | introd. | Frequent in developed land and occasional in sand prairie | — |
| *Arisaema dracontium* | Green Dragon | native | Infrequent in wet-mesic floodplain forest | — |
| *Arisaema triphyllum* | Jack-in-the-Pulpit | native | Infrequent in sand forest | — |
| *Aristida basiramea* | Forktip Three-awn Grass | native | Frequent in sand prairie and sand savanna | — |
| *Aristida oligantha* | Prairie Three-awn Grass | native | Infrequent in sand prairie and successional field | — |
| *Aristida tuberculosa* | Beach Three-awn Grass | native | Frequent in sand prairie and sand savana; Infrequent in sand forest | — |
| *Artemisia campestris* | Wormwood | native | Occasional in sand forest, sand prairie, and sand savanna | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Artemisia ludoviciana* | White Sage | native | Occasional in sand prairie and sand savanna | — |
| *Asclepias amplexicaulis* | Sand Milkweed | native | infrequent in sand prairie | — |
| *Asclepias incarnata* | Swamp Milkweed | native | Infrequent in wet-mesic floodplain forest | — |
| *Asclepias syriaca* | Common Milkweed | native | Infrequent in successional field | — |
| *Asclepias tuberosa* | Butterflyweed | native | Rare in sand savanna | — |
| *Asclepias verticillata* | Horsetail Milkweed | native | Frequent in sand prairie; occasional in sand savanna; infrequent in pastureland | — |
| *Asclepias viridiflora* | Tall Green Milkweed | native | Occasional in sand prairie and sand savanna | — |
| *Asparagus officinalis* | Asparagus | introd. | Occasional in sand savanna | — |
| *Asplenium platyneuron* | Ebony Spleenwort | native | Infrequent in sand forest | — |
| *Aster cordifolius* | Heart-leaved Aster | native | Infrequent in sand forest | — |
| *Aster ericoides* | White Prairie Aster | native | Occasional in sand prairie | — |
| *Aster lanceolatus* | Panicled Aster | native | Frequent in wet-mesic floodplain forest | — |
| *Aster lateriflorus* | Starved Aster | native | Occasional in wet-mesic floodplain forest | — |
| *Aster linariifolius* | Flax-leaved Aster | native | Occasional in sand forest, sand prairie, and sand savana | — |
| *Aster oblongifolius* | Aromatic Aster | native | Infrequent in sand forest and sand prairie | — |
| *Aster ontarionis* | Ontario Aster | native | Frequent in wet-mesic floodplain forest | — |
| *Aster oolentangiensis* | Sky Blue Aster | native | Rare in sand savanna | — |
| *Aster pilosus* | Hairy Aster | native | Common in sand prairie and sand savanna | |
| *Aster prenanthoides* | Crooked-stemmed Aster | native | Occasional in wet-mesic floodplain forest | — |
| *Aster puniceus* | Purple-stemmed Aster | native | Occasional in wet-mesic floodplain forest | — |
| *Aster sericeus* | Western Silvery Aster | native | Infrequent in sand prairie | — |
| *Athyrium filix-femina* var. *angustum* | Lady Fern | native | Infrequent in sand forest | — |
| *Bacopa rotundifolia* | Water Hyssop | native | Rare in natural sand pond | — |
| *Barbarea vulgaris* | Yellow Rocket | introd. | Infrequent in developed land | — |
| *Berberis thunbergii* | Japanese Barberry | introd. | Infrequent in sand forest and sand savanna | — |
| *Berteroa incana* | Hoary Alyssum | introd. | Occasional in developed land, sand prairie and sand savanna | — |
| *Besseya bullii* | Kitten Tails | native | Occasional in sand forest, sand prairie, and sand savanna | T |
| *Betula nigra* | River Birch | native | Occasional in wet-mesic floodplain forest | — |
| *Bidens cernua* | Bur-marigold | native | Occasional in wet-mesic floodplain forest | — |
| *Bidens tripartita* | Beggar-ticks | introd. | Occasional in wet-mesic floodplain forest | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Bidens vulgata* | Tall Beggar-ticks | native | Occasional in wet-mesic floodplain forest | — |
| *Boehmeria cylindrica* | False Nettle | native | Occasional in wet-mesic bottomland forest | — |
| *Botrychium dissectum* | Dissected Grapefern | native | Occasional in wet-mesic floodplain forest | — |
| *Botrychium virginianum* | Rattlesnake Fern | native | Infrequent in wet-mesic floodplain forest | — |
| *Bouteloua curtipendula* | Side-oats Grama Grass | native | Occasional in sand prairie | — |
| *Bouteloua gracilis* | Blue Grama-grass | native | Rare in sand prairie | ND |
| *Bouteloua hirsuta* | Hairy Grama Grass | native | Frequent in sand prairie | — |
| *Brassica nigra* | Black Mustard | introd. | Infrequent in developed land | |
| *Brickellia eupatorioides* | False Boneset | native | Infrequent in sand prairie | — |
| *Bromus inermis* | Awnless Brome | introd. | Occasional in developed land and sand prairie | — |
| *Bromus kalmii* | Kalm's Brome | native | Infrequent in wet-mesic floodplain forest | — |
| *Bromus racemosus* | Smooth Chess | introd. | Occasional to frequent in sand prairie and sand savanna | — |
| *Bromus tectorum* | Downy Chess | introd. | Frequent in developed land and sand prairie and sand savanna | — |
| *Bulbostylis capillaris* | Autumn Sedge | native | Occasional in sand prairie | — |
| *Calamovilfa longifolia* | Sand-reed | native | Rare in sand savanna | — |
| *Callirhoë triangulata* | Poppy Mallow | native | Occasional in sand prairie and sand savanna | — |
| *Caltha palustris* | Marsh Marigold | native | Rare in wet-mesic floodplain forest | — |
| *Calystegia sepium* | American Bindweed | native | Infrequent in developed land along edge of wet-mesic floodplain forest | — |
| *Campanula americana* | American Bellflower | native | Occasional in wet-mesic bottomland forest | — |
| *Cannabis sativa* | Marijuana | introd. | Occasional in sand savanna | — |
| *Capsella bursa-pastoris* | Shepard's Purse | introd. | Occasional in developed land | — |
| *Cardamine bulbosa* | Spring Cress | native | Occasional in wet-mesic floodplain forest | — |
| *Cardamine hirsuta* | Spring Cress | introd. | Infrequent in wet-mesic floodplain forest | — |
| *Cardamine parviflora* var. *arenicola* | Small-flowered Bitter Cress | native | Occasional in sand savanna | — |
| *Cardamine pensylvanica* | Pennsylvania Bitter-cress | native | Occasional in wet-mesic floodplain forest | — |
| *Carduus nutans* | Musk Thistle | introd. | Infrequent in successional field | — |
| *Carex annectens* | Large Yellow Fox Sedge | native | Occasional in sand prairie, edge of ponds, and wet-mesic floodplain forest | — |
| *Carex bicknellii* | Copper-shouldered Oval Sedge | native | Frequent in sand prairie and sand savanna | — |
| *Carex blanda* | Common Wood Sedge | native | Occasional in sand forest | — |
| *Carex brevior* | Plains Oval Sedge | native | Frequent in sand prairie | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Carex conjuncta* | Green-headed Fox Sedge | native | Occasional in wet-mesic floodplain forest | — |
| *Carex cristatella* | Crested Oval Sedge | native | Occasional in wet-mesic bottomland forest | — |
| *Carex duriuscula* | Sedge | native | Rare in developed land | — |
| *Carex frankii* | Bristly Cattail Sedge | native | Occasional in wet-mesic bottomland forest and along streams | — |
| *Carex gravida* | Long-awned Bracted Sedge | native | Occasional in developed land and sand prairie | — |
| *Carex grayi* | Common Bur Sedge | native | Occasional in wet mesic floodplain forest | — |
| *Carex grisea* | Wood Gray Sedge | native | Occasional in wet-mesic floodplain forest | — |
| *Carex hirtifolia* | Hairy Wood Sedge | native | Occasional in sand forest | — |
| *Carex hystericina* | Porcupine Sedge | native | Occasional in wet-mesic floodplain forest | — |
| *Carex laeviconica* | Long-toothed Lake Sedge | native | Rare along edge of ox-bow lake | — |
| *Carex lupulina* | Common Hop Sedge | native | Occasional in edge of pond and wet-mesic floodplain forest | — |
| *Carex meadii* | Mead's Stiff Sedge | native | Infrequent in sand prairie and sand savanna | — |
| *Carex molesta* | Field Oval Sedge | native | Occasional in sand prairie | — |
| *Carex muhlenbergii* | Sand Bracted Sedge | native | Frequent in sand prairie and sand savanna; occasional in sand forest | — |
| *Carex pensylvanica* | Common Oak Sedge | native | Occasional to frequent in sand forest, sand prairie and sand savanna | — |
| *Carex rosea* | Curly-styled Wood Sedge | native | Occasional in sand forest | — |
| *Carex scoparia* var. *scoparia* | Lance-fruited Oval Sedge | native | Occasional in sand savanna | — |
| *Carex stipata* | Common Fox Sedge | native | Occasional in sand forest | — |
| *Carex stricta* | Common Tussock Sedge | native | Occasional in wet-mesic floodplain forest | — |
| *Carex tonsa* | Shaved Sedge | native | Frequent in sand prairie and sand savanna; occasional in sand forest | E |
| *Carex tribuloides* | Awl-fruited Oval Sedge | native | Occasional in edge of pond | — |
| *Carex typhina* | Common Cattail Sedge | native | Infrequent in sand forest | — |
| *Carex vulpinoidea* | Brown Fox Sedge | native | Occasional in developed land | — |
| *Carya cordiformis* | Bitternut Hickory | native | Occasional in sand forest and wet-mesic floodplain forest | — |
| *Carya ovata* | Shagbark Hickory | native | Occasional in sand forest | — |
| *Carya tomentosa* | Mockernut Hickory | native | Occasional in sand forest | — |
| *Catalpa speciosa* | Northern Catalpa | introd. | Infrequent in wet-mesic floodplain forest | — |
| *Ceanothus americanus* | New Jersey Tea | native | Infrequent in sand savanna | — |
| *Ceanothus herbaceus* (*C. ovatus*) | Redroot | native | Occasional to frequent in sand prairie | E |
| *Celastrus scandens* | Bittersweet | native | Occasional in sand forest | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Celtis occidentalis* | Hackberry | native | Occasional in sand forest and sand savanna Infrequent in sand prairie | — |
| *Cenchrus longispinus* | Sand Bur | native | Frequent in developed land and occasional in sand prairie | — |
| *Centaurea maculosa* | Spotted Knapweed | introd. | Occasional in successional field | — |
| *Cephalanthus occidentalis* | Buttonbush | native | Occasional in wet-mesic bottomland forest | — |
| *Cerastium brachypodum* | Mouse-eared Chickweed | introd. | Occasional in sand prairie and developed land | — |
| *Cerastium vulgatum* | Common Mouse-eared Chickweed | introd. | Occasional in developed land and sand prairie and sand savanna | — |
| *Ceratophyllum demersum* | Hornwort | native | Occasional as aquatic in Mississippi River | — |
| *Chaenorrhinum minus* | Dwarf Snapdragon | introd. | Occasional in developed land | — |
| *Chamaecrista fasciculata* | Partridge Pea | native | Occasional in sand prairie and sand savanna | — |
| *Chamaesyce geyeri* | Geyer's Spurge | native | Frequent in sand prairie and sand savanna | — |
| *Chamaesyce maculata* | Spotted Spurge | native | Occasional in developed land | — |
| *Chamaesyce nutans* | Eyebane | native | Occasional in developed land | — |
| *Chenopodium ambrosioides* | Mexican Tea | introd. | Occasional in developed land and successional field | — |
| *Chenopodium gigantospermum* | Maple-leaved Goose Foot | native | Infrequent in sand savanna | — |
| *Chenopodium pratericola* | Goosefoot | native | Occasional in sand prairie, sand savanna and sand forest; infrequent in developed land | — |
| *Chenopodium simplex* | Maple-leaved Goosefoot | native | Occasional in sand forest and sand savanna | — |
| *Chloris verticillata* | Windmill Grass | introd. | Occasional in developed land and successional field | — |
| *Cicuta maculata* | Water Hemlock | native | Infrequent in wet-mesic floodplain forest | — |
| *Cinna arundinacea* | Common Woodreeed | native | Infrequent in wet-mesic floodplain forest | — |
| *Circaea lutetiana* subsp. *canadensis* | Enchanter's Nightshade | native | Occasional in sand forest | — |
| *Cirsium arvense* | Canada Thistle | introd. | Infrequent in pastureland | — |
| *Cirsium discolor* | Field Thistle | native | Infrequent in wet-mesic bottomland forest | — |
| *Cirsium vulgare* | Bull Thistle | introd. | Infrequent in sand savanna | — |
| *Claytonia virginica* | Spring Beauty | native | Frequent in sand forest | — |
| *Clematis virginiana* | Virgin's Bower | native | Infrequent in wet-mesic floodplain forest | — |
| *Comandra umbellata* | False Toadflax | native | Occasional in sand prairie and sand savanna | — |
| *Commelina erecta* | Erect Day-flower | native | Occasional in sand forest and sand savanna | — |
| *Conium maculatum* | Poison Hemlock | introd. | Infrequent in wet-mesic floodplain forest | — |
| *Convolvulus arvensis* | Field Bindweed | introd. | Occasional in sand prairie | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Conyza canadensis* | Horseweed | native | Frequent in successional field, infrequent in sand savanna | — |
| *Coreopsis palmata* | Prairie Coreopsis | native | Infrequent in sand prairie and sand savanna | — |
| *Cornus drummondii* | Rough-leaved Dogwood | native | Occasional in sand forest and sand savanna | — |
| *Cornus racemosa* | Gray Dogwood | native | Frequent in sand forest, sand savanna, and wet-mesic floodplain forest | — |
| *Coronilla varia* | Crown Vetch | introd. | Occasional in developed land, sand prairie, and sand savanna | — |
| *Corydalis micrantha* | Slender Corydalis | native | Occasional in sand forest and sand savanna | — |
| *Corylus americana* | Hazelnut | native | Infrequent in sand forest | — |
| *Crataegus calpodendron* | Hawthorn | native | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Crepis tectorum* | Hawksbeard | introd. | Infrequent in sand prairie and successional field | — |
| *Crotalaria sagittalis* | Rattlebox | native | Occasional in sand prairie and sand savanna | — |
| *Croton glandulosus* var. *septentrionalis* | Sand Croton | native? | Occasional in sand prairie and sand savanna | — |
| *Cryptotaenia canadensis* | Honewort | native | Abundant in wet-mesic floodplain forest; occasional in sand forest | — |
| *Cycloloma atriplicifolium* | Winged Pigweed | native | Occasional in developed land, sand forest, sand prairie, and sand savanna | |
| *Cynoglossum officinale* | Common Hound's-tongue | introd. | Occasiona in developed land and sand savanna | — |
| *Cyperus aristatus* | Flatsedge | native | Occasional in wet-mesic floodplain forest | — |
| *Cyperus erythrorhizos* | Redroot Flatsedge | native | Occasional in wet-mesic bottomland forest | — |
| *Cyperus esculentus* var. *esculentus* | Yellow Nutsedge | native | Occasional in wet-mesic bottomland forest | — |
| *Cyperus filiculmis* var. *filiculmis* | Slender Sand Sedge | native | Frequent in sand prairie and sand savnaan; occasional in sand forest | — |
| *Cyperus filiculmis* var. *macilentus* | Slender Sand Sedge | native | Occasional in sand forest; frequent in sand prairie and sand savanna | — |
| *Cyperus grayioides* | Gray's Umbrella Sedge | native | Occasional in blowouts of sand prairie and sand savanna | T |
| *Cyperus odoratus* | Flatsedge | native | Occasional in wet-mesic floodplain forest | — |
| *Cyperus schweinitzii* | Rough Sand Sedge | native | Occasional in sand forest; frequent in sand prairie and sand savanna | — |
| *Cystopteris protrusa* | Fragile Fern | native | Occasional in sand forest | — |
| *Dactylis glomerata* | Orchard Grass | introd. | Occasional in developed land | — |
| *Daucus carota* | Queen Anne's Lace | introd. | Occasional in successional field | — |
| *Descurainia pinnata* subsp. *brachycarpa* | Tansy Mustard | native | Infrequent in sand prairie, sand savanna, and developed land | — |
| *Desmodium canadense* | Canadian Tick-trefoil | native | Infrequent in opening in wet-mesic floodplain forest | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Desmodium glutinosum* | Pointed Tick Trefoil | native | Occasional in sand forest | — |
| *Desmodium illinoense* | Illinois Tick Trefoil | native | Infrequent in sand prairie | — |
| *Dianthus armeria* | Deptford Pink | introd. | Occasional in sand prairie and sand savanna | — |
| *Dicentra cucullaria* | Dutchman's Breeches | native | Infrequent in sand forest | — |
| *Digitaria sanguinalis* | Hairy Crabgrass | introd. | Occasional in developed land | — |
| *Diodia teres* | Rough Buttonweed | native? | Frequent in sand prairie and sand savanna and occasional in sand forest | — |
| *Draba nemorosa* var. *leiocarpa* | Whitlow Grass | native | Rare in sand prairie | ND |
| *Draba reptans* | Common Whitlow Grass | native | Frequent in sand prairie and sand savanna | — |
| *Draba verna* | Vernal Whitlow Grass | introd. | Occasional in developed land | — |
| *Dryopteris carthusiana* | Spinulose Woodfern | native | Occasional in sand forest | — |
| *Echinacea pallida* | Pale Coneflower | native | Only one plant seed in dry-mesic prairie | — |
| *Echinochloa crusgalli* | Barnyard Grass | introd. | Occasional in developed land and wet-mesic bottomland forest | — |
| *Echinochloa muricata* | Barnyard-grass | native | Infrequent in wet-mesic floodplain forest | — |
| *Echium vulgare* | Blueweed | introd. | Occasional in developed land | — |
| *Eclipta prostrata* | Yerba-de-tajo | native | Occasional in wet-mesic floodplain forest | — |
| *Elaeagnus angustifolia* | Russian Olive | introd. | Occasional in sand forest and sand savanna and infrequent in sand prairie | — |
| *Eleocharis acicularis* | Spikerush | native | Occasional in ponds and wet-mesic floodplain forest | — |
| *Eleocharis erythropoda* | Spike-rush | native | Occasional in wet-mesic bottomland forest | — |
| *Eleocharis obtusa* | Spike Rush | native | Occasional in natural sand pond and in wet-mesic bottomland forest | — |
| *Ellisia nyctelea* | Ellisia | native | Occasional in sand forest | — |
| *Elodea nuttallii* | Free-flowered Water-weed | native | Occasional as aquatic in Mississippi River | — |
| *Elymus canadensis* | Nodding Wild Rye | native | Occasional in sand prairie | — |
| *Elymus virginicus* | Virginia Wild Rye | native | Occasional in wet-mesic bottomland forest | — |
| *Epilobium ciliatum* | American Willow-herb | native | Infrequent in wet-mesic floodplain forest | — |
| *Equisetum arvense* | Common Horsetail | native | Occasional in wet-mesic floodplain forest | — |
| *Equisetum hyemale* var. *affine* | Scouring Rush | native | Occasional in developed land and sand prairie | — |
| *Equisetum laevigatum* | Smooth Scouring Rush | native | Occasional in sand prairie and sand savanna | — |
| *Equisetum pratense* | Meadow Horsetail | native | Rare in sand forest | E |
| *Equisetum* × *ferrissii* | Scouring Rush | native | Occasional in sand prairie | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Eragrostis cilianensis* | Stink-grass | introd. | Occasional in developed land and infrequent in sand prairie | — |
| *Eragrostis hypnoides* | Annual Lovegrass | native | Occasional in wet-mesic floodplain forest | — |
| *Eragrostis pectinacea* | Small Love Grass | native | Occasional in developed land and successional field | — |
| *Eragrostis poaeoides* | Low Love Grass | introd. | Occasional in developed land | — |
| *Eragrostis spectabilis* | Tumblegrass | native | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Eragrostis trichoides* | Sand-lovegrass | native | Infrequent in sand prairie | — |
| *Erechtites hieracifolia* | Fireweed | native | Occasional in sand forest, sand savanna, and wet-mesic floodplain forest | — |
| *Erigeron annuus* | Daisy Fleabane | native | Occasional in sand forest | — |
| *Erigeron philadelphicus* | Marsh Fleabane | native | Occasional in sand forest | — |
| *Erigeron strigosus* | Daisy Fleabane | native | Occasional in sand prairie and sand savanna; infrequent in sand forest | — |
| *Erysimum inconspicuum* | Treacle Mustard | introd. | Occasional in developed land, sand prairie and sand savanna | — |
| *Euonymus atropurpurea* | Wahoo | native | Occasional in sand forest | — |
| *Eupatorium perfoliatum* | Common Boneset | native | Occasional in wet-mesic floodplain forest | — |
| *Eupatorium purpureum* | Spotted Joe-Pye-weed | native | Occasional in sand forest border with wet-mesic floodplain forest | — |
| *Eupatorium rugosum* | White Snakeroot | native | Occasional in sand forest; infrequent in sand savanna | — |
| *Eupatorium serotinum* | Late Boneset | native | Infrequent in pastureland and sand forest | — |
| *Euphorbia corollata* | Flowering Spurge | native | Frequent in sand prairie and sand savanna; occasional in sand forest | — |
| *Euphorbia dentata* | Toothed Spurge | native | Occasional in developed land; infrequent in sand savanna | — |
| *Euphorbia esula* | Leafy Spurge | introd. | Rare in sand prairie | — |
| *Festuca elatior* | Tall Fescue | introd. | Occasional in developed land | — |
| *Festuca obtusa* | Nodding Fescue | native | Occasional in sand forest and sand savanna | — |
| *Festuca ovina* | Slender Fescue | introd. | Infrequent in sand prairie | — |
| *Festuca pratensis* | Meadow Fescue | introd. | Infrequent in developed land | — |
| *Fragaria virginiana* | Wild Strawberry | native | Occasional in sand forest and sand savanna | — |
| *Fraxinus pennsylvanica* | Green Ash | native | Frequent in sand forest, sand savanna, and wet-mesic floodplain forest. Infrequent in sand prairie | — |
| *Froelichia floridana* var. *campestris* | Cottonweed | native | Occasional in sand prairie and sand savanna | — |
| *Froelichia gracilis* | Small Cottonweed | introd. | Occasional in successional fields; infrequent in sand prairie and sand savanna | — |
| *Galearis spectabilis* | Showy Orchis | Native | Infrequent in sand forest | — |
| *Galium aparine* | Goosegrass | natve | Occasional in sand forest | — |
| *Galium circaezans* | Forest-bedstraw | native | Occasional in sand forest | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Galium concinnum* | Shining Bedstraw | native | Occasional in sand forest, sand savanna, and successional field | — |
| *Galium triflorum* | Sweet-scented Bedstraw | native | Occasional in sand forest and wet-mesic floodplain forest | — |
| *Gaura longiflora* | Gaura | native | Infrequent in sand savanna and wet-mesic floodplain forest | — |
| *Geranium carolinianum* | Wild Cranesbill | native | Infrequent in sand forest, sand prairie, and sand savanna | — |
| *Geranium maculatum* | Wild Geranium | native | Infrequent in dry upland forest | — |
| *Geum canadense* | White Avens | native | Occasional in sand forest | — |
| *Geum triflorum* | Prairie Smoke | native | Infrequent in sand prairie | — |
| *Gleditsia triacanthos* | Honey Locust | native | Occasional in sand forest, sand prairie, sand savanna, and wet-mesic floodplain forest | — |
| *Glyceria striata* var. *striata* | Fowl Manna Grass | native | Occasional in wet-mesic floodplain forest | — |
| *Gnaphalium obtusifolium* | Fragrant Cudweed | native | Occasional in sand prairie and sand savanna | — |
| *Gratiola neglecta* | Clammy Hedge Hyssop | native | Infrequent in pond margins and wet-mesic floodplain forest | — |
| *Grindelia squarrosa* var. *squarrosa* | Curlycup-gumweed | native | Infrequent in sand prairie | — |
| *Gymnocladus dioicus* | Kentucky Coffeetree | native | Occasional in wet-mesic floodplain forest; Infrequent in sand forest | — |
| *Hackelia virginiana* | Stickseed | native | Occasional in sand forest and sand savanna | — |
| *Hedeoma hispida* | Rough Pennyroyal | native | Frequent in sand prairie and sand savanna | — |
| *Helenium autumnale* | Common Sneezeweed | native | Occasional in wet-mesic floodplain forest | — |
| *Helianthemum bicknellii* | Frostweed | native | Occasional in sand prairie and sand savanna | — |
| *Helianthemum canadense* | Common Rockrose | native | Occasional in sand prairie and sand savanna | — |
| *Helianthus annuus* | Common Sunflower | introd. | Infrequent in successional fields and sand forest; rare in sand prairie | — |
| *Helianthus hirsutus* | Hairy Sunflower | native | Occasional in sand forest | — |
| *Helianthus mollis* | Ashy Sunflower | native | Infrequent in sand prairie | — |
| *Helianthus occidentalis* | Western Sunflower | native | Occasional in sand prairie | — |
| *Helianthus rigidus* | Stiff Sunflower | native | Occasional in wet-mesic floodplain forest | — |
| *Helianthus tuberosus* | Jerusalem-artichoke | native | Occasional in wet-mesic floodplain forest | — |
| *Heliopsis helianthoides* | False Sunflower | native | Infrequent in sand savanna | — |
| *Hemerocallis fulva* | Daylily | introd. | Infrequent in disturbed area of sand forest | — |
| *Heracleum lanatum* | Cow Parsnip | native | Infrequent in wet-mesic floodplain forest | — |
| *Heteranthera dubia* | Water Star-grass | native | Occasional aquatic in Mississippi River | — |
| *Heterotheca camporum* | Golden Aster | native | Frequent in sand prairie; occasional in sand savanna | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Hibiscus laevis* | Smooth Rose-mallow | native | Occasional in wet-mesic floodplain forest | — |
| *Hieracium longipilum* | Hairy Hawkweed | native | Occasional in sand prairie | — |
| *Holosteum umbellatum* | Jagged Chickweed | introd. | Frequent in developed land and occasional sand prairie | — |
| *Hordeum jubatum* | Squirrel-tail Grass | introd.? | Occasional in developed land and pastureland | — |
| *Hudsonia tomentosa* | False Heather | native | Occasional in sand prairie and sand savanna | E |
| *Humulus japonicus* | Japanese Hops | introd. | Rare in sand savanna | — |
| *Humulus lupulus* | Hops | native | Infrequent in sand forest | — |
| *Hydrophyllum virginianum* | Great Waterleaf | native | Occasional in wet-mesic floodplain forest | — |
| *Hypericum perforatum* | Common St. John's-wort | native | Infrequent in sand prairie | — |
| *Hypericum punctatum* | Spotted St. John's-wort | native | Occasional in wet-mesic bottomland forest | — |
| *Hypericum sphaerocarpum* | Round-fruited St. John's-wort | native | Infrequent in sand forest | — |
| *Impatiens capensis* | Orange Touch-me-not | native | Occasional in wet-mesic floodplain forest | — |
| *Impatiens pallida* | Pale Touch-me-not | native | Occasional in wet-mesic floodplain forest | — |
| *Iris shrevei* | Blue Flag | native | Occasional along oxbow lake and in wet-mesic bottomland forest | — |
| *Juglans cinerea* | White Walnut | native | Occasional in sand forest | — |
| *Juglans nigra* | Black Walnut | native | Frequent in sand forest, sand savanna, and occasional in sand prairie | — |
| *Juncus interior* | Inland Rush | native | Occasional in wet-mesic floodplain forest | — |
| *Juncus tenuis* | Path Rush | native | Occasional in developed land | — |
| *Juniperus virginiana* | Red Cedar | native | Frequent in sand savanna, occasional in sand forest and sand prairie | — |
| *Koeleria macrantha* | June Grass | native | Frequent in sand prairie and sand savanna | — |
| *Krigia virginica* | Dwarf Dandelion | native | Frequent in sand prairie and sand savanna; occasional in sand forest | — |
| *Kummerowia stipulacea* | Korean Clover | intord | Occasional in developed land and successional fields | — |
| *Lactuca canadensis* | Tall Lettuce | native | Occasional in wet-mesic floodplain forest | — |
| *Lactuca floridana* | Woodland Lettuce | native | Occasional in wet-mesic floodplain forest | — |
| *Lactuca serriola* | Prickly Lettuce | introd. | Infrequent in developed land | — |
| *Laportea canadensis* | Wood Nettle | native | Frequent in wet-mesic bottomland forest | — |
| *Lappula echinata* | Beggar's Lice | introd. | Infrequent in sand prairie and in pasture | — |
| *Lechea pulchella* | Pretty Pinweed | native | Occasional in sand prairie and sand savanna | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Lechea tenuifolia* | Slender-leaved Pinweed | native | Occasional in sand prairie and sand savanna | — |
| *Leersia oryzoides* | Rice Cut-grass | native | Occasional in wet-mesic floodplain forest | — |
| *Leersia virginica* | White Grass | native | Frequent in wet-mesic bottomland forest | — |
| *Lemna minor* | Lesser Duckweed | native | Frequent on water of ponds and Mississippi river (aquatic) | — |
| *Leonurus cardiaca* | Motherwort | introd. | Occasional in sand forest and sand savanna | — |
| *Lepidium campestre* | Field Peppergrass | introd. | Occasional to locally frequent in developed land and sand prairie | — |
| *Lepidium densiflorum* | Small Peppergrass | introd. | Frequent in sand prairie and sand savanna | — |
| *Lepidium virginicum* | Common Peppergrass | native | Abundant in sand prairie and sand savanna | — |
| *Leptoloma cognatum* | Fall Witch Grass | native | Frequent in sand prairie and sand savanna | — |
| *Lespedeza capitata* | Round-headed Bush-clover | native | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Lespedeza intermedia* | Wand-lespedeza | native | Occasional in sand forest | — |
| *Liatris aspera* | Rough Blazing-star | native | Locally frequent in sand prairie; occasional in sand savanna; infrequent in sand forest | — |
| *Linaria canadensis* | Blue Toadflax | native | Occasional in sand prairie and sand savanna | — |
| *Linaria vulgaris* | Butter-and-eggs | introd. | Infrequent in developed land | — |
| *Lindernia dubia* var. *dubia* | False Pimpernel | native | Occasional in wet-mesic floodplain forest | — |
| *Linum sulcatum* | Yellow Flax | native | Occasional in sand prairie and sand savanna | — |
| *Liparis liliifolia* | Large Twayblade | native | Rare in wet-mesic floodplain forest | — |
| *Lithospermum caroliniense* | Hairy Puccoon | native | Occasional in sand prairie and sand savanna | — |
| *Lithospermum incisum* | Fringed Puccoon | native | Occasional in sand prairie and sand savanna | — |
| *Lobelia cardinalis* | Cardinal Flower | native | Occasional in wet-mesic bottomland forest | — |
| *Lobelia inflata* | Indian Tobacco | native | Infrequent in wet-mesic floodplain forest and sand forest | — |
| *Lobelia siphilitica* | Blue Lobelia | native | Occasional in wet-mesic floodplain forest | — |
| *Lolium perenne* | Perennial Rye Grass | introd. | Occasional in developed land | — |
| *Lonicera morrowii* | Bush Honeysuckle | introd. | Occasional in sand forest | — |
| *Lonicera tatarica* | Tartarian Honeysuckle | introd. | Occasional in sand forest and sand savanna | — |
| *Lycopus americanus* | Common Water Horehound | native | Occasional in wet-mesic floodplain forest | — |
| *Lycopus uniflorus* | Northern Water-horehound | native | Occasional in wet-mesic bottomland forest | — |
| *Lysimachia ciliata* | Fringed Loosestrife | native | Occasional in wet-mesic bottomland forest | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Lythrum salicaria* | Purple Loosestrife | introd. | Rare in open edge of Mississippi River (wet-mesic floodplain forest) | — |
| *Malus coronaria* | Wild Sweet Crab | native | Infrequent in sand prairie | — |
| *Malus ioensis* | Iowa Crab | native | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Malus pumila* | Apple | introd. | Infreauent in dry upland forest and wet-mesic floodplain forest | — |
| *Malva neglecta* | Common Mallow | introd. | Infrequent in disturbed wet-mesic floodplain forest | — |
| *Matricaria matricarioides* | Pineapple-weed | introd. | Infrequent in successional field | — |
| *Medicago lupulina* | Black Medic | introd. | Occasional in developed land | — |
| *Melilotus alba* | White Sweet Clover | introd. | Occasional in developed land and sand prairie | — |
| *Melilotus officinalis* | Yellow Sweet Clover | introd. | Frequent in successional field, occasional in sand prairie and sand savanna | — |
| *Menispermum canadense* | Moonseed | native | Occasional in sand forest | — |
| *Mentha arvensis* var. *villosa* | Field Mint | introd. | Occasional in wet-mesic floodplain forest | — |
| *Mimulus ringens* | Allegheny Monkey-flower | native | Infrequent in wet-mesic floodplain forest | — |
| *Mirabilis hirsuta* | Hairy Umbrella Wort | native | Infrequent in sand savanna and sand forest | E |
| *Mirabilis nyctaginea* | Wild Four O'Clock | introd. | Occasional in developed land and successional fields | — |
| *Mollugo verticillatus* | Carpetweed | introd. | Frequent in sand forest, sand prairie, sand savanna, and successional field | — |
| *Monarda fistulosa* | Wild Bergamot | native | Occasional in sand savanna and wet-mesic bottomland forest | — |
| *Monarda fistulosa* var. *mollis* | Wild Bergamot | native | Infrequent in sand savanna | — |
| *Monarda punctata* | Horsemint | native | Frequent in sand prairie and sand savanna; occasonal in sand forest | — |
| *Morus alba* | White Mulberry | introd. | Infrequent in sand forest and sand savanna | — |
| *Muhlenbergia mexicana* | Western Muhly | native | Occasional in wet-mesic floodplain forest | — |
| *Muhlenbergia racemosa* | Muhly | native | Infrequent in sand forest, sand prairie, and sand savanna | — |
| *Muhlenbergia schreberi* | Nimblewill | native | Occasional in sand forest and wet-mesic floodplain forest | — |
| *Myosoton aquaticum* | Water Chickweed | introd. | Occasional in wet-mesic floodplain forest | — |
| *Myriophyllum spicatum* | European Water-milfoil | introd. | Infrequent aquatic in Mississippi River | — |
| *Najas minor* | Naiad | native | Occasional aquatic in Oxbow Lake and Mississippi River | — |
| *Nelumbo lutea* | American Lotus | native | Occasional as aquatic in Mississippi River | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Nepeta cataria* | Catnip | introd. | Occasional in developed land and sand savanna | — |
| *Nymphaea tuberosa* | Water-lily | native | Occasional aquatic in Mississippi River | — |
| *Oenothera biennis* | Common Evening-primrose | native | Infrequent in wet-mesic bottomland forest | — |
| *Oenothera laciniata* | Ragged Evening Primrose | native | Infrequent in disturbed sand prairie | — |
| *Oenothera rhombipetala* | Sand Primrose | native | Occasional in sand forest; frequent in sand prairie and sand savanna | — |
| *Onoclea sensibilis* | Sensitive Fern | native | Occasional in sand forest and wet-mesic floodplain forest | — |
| *Ophioglossum pusillum* | Northern Adder's Tongue | native | Rare in wet-mesic floodplain forest | — |
| *Opuntia fragilis* | Fragile Prickly-pear | native | Locally frequent in sand prairie | E |
| *Opuntia macrorhiza* | Prickly-pear | native | Frequent in sand prairie and sand savanna | — |
| *Orobanche fasciculata* | Clustered Broomrape | native | not observed at SAD since 1908, but suitable habitat still extant | E |
| *Osmorhiza claytonii* | Hairy Sweet Cicely | native | Infrequent in sand forest | — |
| *Osmorhiza longistylis* | Smooth Sweet Cicely | native | Infrequent in sand forest | — |
| *Osmunda claytoniana* | Interrupted Fern | native | Occasional in wet-mesic floodplain forest at its border with sand forest | — |
| *Oxalis dillenii* | Yellow Wood Sorrel | native | Occasional in sand forest and sand savanna | — |
| *Panicum capillare var capillare* | Witch-grass | native | Infrequent in developed land and sand forest | — |
| *Panicum depauperatum* | Starved Panic Grass | native | Occasional in sand prairie and sand savanna | — |
| *Panicum lanuginosum* var. *fasciculatum* | Old-field Panic Grass | native | Occasional in sand forest | — |
| *Panicum lanuginosum* var. *implicatum* | Panic Grass | native | Occasional in sand prairie and sand savanna | — |
| *Panicum linearifolium* | Slender-leaved Panic Grass | native | Occasional in sand prairie and sand savanna | — |
| *Panicum oligosanthes* | Few-flowered Panic Grass | native | Occasional in sand forest, sand prairie and sand savanna | — |
| *Panicum villosissimum* | Hairy Panic Grass | native | Frequent to abundant in sand prairie and sand savanna | — |
| *Panicum virgatum* | Switch Grass | native | Frequent in sand prairie and sand savanna; occasional in sand forest | — |
| *Parietaria pensylvanica* | Pellitory | native | Occasional in sand forest and sand savanna | — |
| *Paronychia canadensis* | Tall Forked Chickweed | native | Occasional in sand savanna | — |
| *Paronychia fasitgiata* | Forked Chickweed | native | Occasional in sand forest | — |
| *Parthenocissus quinquefolia* | Virginia Creeper | native | Occasional in sand forest | — |
| *Parthenocissus vitacea* | Thicket Creeper | native | Occasional in wet-mesic bottomland forest | — |
| *Paspalum bushii* | Hairy Bead Grass | native | Occasional in sand prairie and sand savanna | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Paspalum ciliatifolium* | Paspalum | introd.? | Occasional in sand prairie and sand savanna | — |
| *Pastinaca sativa* | Wild Parsnip | introd. | Infrequent in successional fields | — |
| *Penstemon pallidus* | Pale Beardstongue | native | Occasional in sand forest, sand prairie and sand savanna | — |
| *Penthorum sedoides* | Ditch Stonecrop | native | Occasional in wet-mesic bottomland forest | — |
| *Petalostemum purpureum* | Purple Prairie Clover | native | Occasional in sand prairie | — |
| *Phalaris arundinacea* | Reed Canary Grass | introd. | Occasional in wet-mesic floodplain forest | — |
| *Phlox divaricata* subsp. *laphamii* | Blue Phlox | native | Infrequent in sand forest border with wet-mesic floodplain forest | — |
| *Phryma leptostachya* | Lopseed | native | Occasional in sand forest | — |
| *Phyla lanceolata* | Fog-fruit | native | Occasional in wet-mesic bottomland forest | — |
| *Physalis heterophylla* | Ground Cherry | native | Occasional in sand prairie and sand savanna | — |
| *Physalis longifolia* | Longleaf Ground-cherry | native | Infrequent in wet-mesic floodplain forest | — |
| *Physalis virginiana* | Ground Cherry | native | Frequent in sand prairie and sand savanna | — |
| *Physocarpus opulifolius* | Ninebark | native | Rare in sand forest along Mississippi River | — |
| *Physostegia virginiana* | Obedient Plant | native | Occasional in wet-mesic bottomland forest | — |
| *Pilea pumila* | Clearweed | native | Occasional in wet-mesic floodplain forest | — |
| *Pinus banksiana* | Jack Pine | introd. in NW Illinois | Occasional in tree plantations and scattered trees in sand prairie and sand savanna | — |
| *Pinus resinosa* | Red Pine | introd. in NW Illinois | Occasional in tree plantation | — |
| *Plantago aristata* | Bracted Plantain | native? | Occasional in developed land | — |
| *Plantago lanceolata* | Dwarf Plantain | introd. | Occasional in developed land | — |
| *Plantago patagonica var brevicarpa* | Salt-and-pepper Plant | introd.? | Frequent in sand prairie and sand savanna | — |
| *Plantago rugelii* | Rugel's Plantain | native | Occasional in developed land | — |
| *Plantago virginica* | Dwarf Plantain | native | Occasional in developed land and successional field | — |
| *Poa bulbosa* | Bulbous Bluegrass | introd. | Rare in sand prairie | — |
| *Poa compressa* | Canadian Bluegrass | introd. | Occasional in sand forest, sand prairie and sand savanna | — |
| *Poa palustris* | Fowl Bluegrass | native | Rare in wet-mesic floodplain forest | — |
| *Poa pratensis* | Kentucky Bluegrass | introd. | Abundant in developed land and sand prairie and sand savanna | — |
| *Podophyllum peltatum* | Mayapple | native | Occasional in sand forest | — |
| *Polanisia dodecandra* | Clammyweed | native | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Polanisia jamesii* | James' Clammyweed | native | Frequent in sand forest, sand prairie, and sand savanna | E |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Polygala polygama* var. *obtusata* | Purple Milkwort | native | Occasional in sand prairie and sand savanna | — |
| *Polygala verticillata* | Whorled Milkwort | native | Occasional in sand prairie | — |
| *Polygonatum biflorum* | Solomon's Seal | native | Occasional in sand forest | — |
| *Polygonatum cespitosum* var. *longisetum* | Knotweed | introd. | Infrequent in successional field | — |
| *Polygonella articulata* | Jointweed | native | Occasional in sand prairie and sand savanna | — |
| *Polygonum amphibium* | Water Smartweed | native | Occasional in wet-mesic floodplain forest | — |
| *Polygonum convolvulus* | Black Bindweed | introd. | Occasional in sand forest and sand savanna | — |
| *Polygonum hydropiper* | Water-pepper | Introd. | Growing in wet-mesic floodplain forest | — |
| *Polygonum lapathifolium* | Dock-leaved Smartweed | native | Infrequent in wet-mesic floodplain forest | — |
| *Polygonum pensylvanicum* | Common Smartweed | native | Occasional in wet-mesic floodplain forest | — |
| *Polygonum persicaria* | Lady's Thumb | introd. | Occasional in wet-mesic floodplain forest | — |
| *Polygonum punctatum* | Dotted Smartweed | native | Occasional in wet-mesic floodplain forest | — |
| *Polygonum ramosissimum* | Knotweed | native | Occasional in sand prairie, sand savanna, and wet-mesic floodplain forest | — |
| *Polygonum scandens* | False Buckwheat | native | Occasional in sand forest, sand savanna, and successional field | — |
| *Polygonum tenue* | Slender Knotweed | native | Occasional in sand prairie and sand savanna | — |
| *Polygonum virginianum* | Jumpseed | native | Occasional in sand forest | — |
| *Populus deltoides* | Cottonwood | native | Occasional in wet-mesic floodplain forest | — |
| *Populus grandidentata* | Big-tooth Aspen | native | Occasional in sand forest and its border with wet-mesic floodplain forest | — |
| *Populus tremuloides* | Quaking Aspen | native | Occasional in sand forest and sand savanna | — |
| *Portulaca oleracea* | Purslane | introd. | Infrequent in sand prairie | — |
| *Potamogeton crispus* | Curly Pondweed | introd. | Occasional aquatic in Mississippi River | — |
| *Potamogeton nodosus* | Long-leaved Pondweed | native | Occasional aquatic in pond and Mississippi River | — |
| *Potamogeton pectinatus* | Sago Pondweed | native | Occasional aquatic in Mississippi River | — |
| *Potamogeton pusillus* | Slender Pondweed | native | Occasional aquatic in Mississippi River | — |
| *Potentilla argentea* | Silvery Cinquefoil | introd. | Frequent to Abundant in developed land and sand prairie; occasional in sand savanna | — |
| *Potentilla inclinata* | Hoary Cinquefoil | introd. | Rare in successional field | — |
| *Potentilla norvegica* | Rough Cinquefoil | native | Occasional in developed land and wet-mesic floodplain forest | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Potentilla recta* | Sulfur Cinquefoil | introd. | Frequent in sand prairie and sand savanna; occasional in sand forest | — |
| *Potentilla simplex* | Old-field Cinquefoil | native | Occasional in sand forest | — |
| *Prunella vulgaris* | Self-heal | introd. | Occasional in developed land and sand savanna | — |
| *Prunus americana* | Wild Plum | native | Frequent in sand forest and sand savanna | — |
| *Prunus nigra* | Canadian Plum | native | Rare in sand forest | — |
| *Prunus serotina* | Wild Black Cherry | native | Occasional in sand forest and sand savanna | — |
| *Prunus virginiana* | Choke Cherry | native | Occasional in sand forest and sand savanna | — |
| *Ptelea trifoliata* | Wafer Ash | native | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Pteridium aquilinum* | Bracken Fern | native | Infrequent in sand forest | — |
| *Pycnanthemum virginianum* | Mountain Mint | native | Infrequent in sand prairie | — |
| *Quercus alba* | White Oak | native | Occasional in sand forest | — |
| *Quercus macrocarpa* | Bur Oak | native | Frequent in sand forest and wet-mesic floodplain forest | — |
| *Quercus muehlenbergii* | Chinquapin Oak | native | Rare in sand savanna | — |
| *Quercus palustris* | Pin Oak | native | Occasional in wet-mesic floodplain forest | — |
| *Quercus rubra* | Northern Red Oak | native | Occasional in sand forest | — |
| *Quercus velutina* | Black Oak | native | Abundant in sand forest and sand savanna. Infrequent in sand prairie | — |
| *Ranunculus abortivus* | Small-flowered Buttercup | native | Occasional in sand forest | — |
| *Ranunculus fascicularis* | Early Buttercup | native | Infrequent in sand prairie | — |
| *Ranunculus hispidus* var. *nitidus* | Rough Buttercup | native | Occasional in wet-mesic floodplain forest | — |
| *Ranunculus pensylvanicus* | Bristly Crowfoot | native | Rare in natural sand pond | — |
| *Ratibida pinnata* | Yellow Coneflower | native | Rare in succesional field | — |
| *Rhamnus cathartica* | Common Buckthorn | introd. | Occasional in sand forest and wet-mesic floodplain forest | — |
| *Rhus aromatica* var. *arenaria* | Sand Fragrant Sumac | native | Frequent in sand prairie, sand savanna; infrequent in sand forest | — |
| *Rhus aromatica* var. *aromatica* | Fragrant Sumac | native | Rare in sand savanna | — |
| *Rhus glabra* | Smooth Sumac | native | Occasional in edge between sand forest and sand prairie | — |
| *Ribes missouriense* | Missouri Gooseberry | native | Frequent in sand forest and occasional in sand savanna | — |
| *Robinia pseudoacacia* | Black Locust | introd. | Frequent in sand forest and sand savanna | — |
| *Rorippa sessiliflora* | Sessile-flowered Yellow Cress | native | Infrequent in wet-mesic floodplain forest | — |
| *Rorippa sylvestris* | Creeping Yellow Cress | introd. | Occasional in wet-mesic floodplain forest | — |
| *Rosa carolina* | Pasture Rose | native | Occasional in sand forest, sand prairie, and sand savanna | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Rosa multiflora* | Multiflora Rose | introd. | Occasional in sand forest and sand savanna | — |
| *Rosa suffulta* | Dwarf Prairie-rose | native | Infrequent in margin of wet-mesic floodplain forest and sand forest | — |
| *Rotala ramosior* | Wheelwort | native | Infrequent in wet-mesic bottomland forest | — |
| *Rubus allegheniensis* | Common Blackberry | native | Occasional in sand forest | — |
| *Rubus argutus* | Blackberry | native | Occasional in sand prairie | — |
| *Rubus flagellaris* | Common Dewberry | native | Occasional to frequent in sand forest and sand savanna | — |
| *Rubus occidentalis* | Black Raspberry | native | Occasional in sand forest and sand savanna | — |
| *Rudbeckia hirta* | Blackeyed Susan | native | Infrequent in sand prairie | — |
| *Rudbeckia laciniata* | Cutleaf Coneflower | native | Occasional in wet-mesic floodplain forest | — |
| *Rudbeckia triloba* | Three-lobed Coneflower | native | Occasional in wet-mesic floodplain forest | — |
| *Ruellia humilis* | Wild Petunia | native | Infrequent in sand savanna | — |
| *Rumex acetosella* | Sour Dock | introd. | Frequent in sand prairie and sand savanna | — |
| *Rumex altissimus* | Pale Dock | native | Infrequent in developed land | — |
| *Rumex crispus* | Curly Dock | introd. | Occasional in edge of pond and wet-mesic bottomland forest | — |
| *Rumex verticillatus* | Swamp Dock | native | Infrequent in wet-mesic bottomland forest | — |
| *Sagittaria latifolia* | Common Arrow-head | native | Occasional in wet-mesic floodplain forest | — |
| *Salix amygdaloides* | Peach-leaved Willow | native | Occasional along oxbow lake | — |
| *Salix eriocephala* | Heart-leaved Willow | native | Occasional in wet-mesic floodplain forest | — |
| *Salix exigua* | Sandbar Willow | native | Occasional in wet-mesic floodplain forest | — |
| *Salix nigra* | Black Willow | native | Occasional in wet-mesic floodplain forest | — |
| *Salsola collina* | Katune | native | Infrequent in sand prairie; occasional in developed land | — |
| *Salvia azurea* subsp. *pitcheri* | Blue Sage | native | Locally Frequent in sand prairie and margin of sand savanna | T |
| *Salvia azurea* subsp. *pitcheri* f. *alba* | White-flowered form of Blue Sage | native | Rare in sand prairie and margin of sand savanna | (T) |
| *Sambucus canadensis* | Elderberry | native | Infrequent in wet-mesic floodplain forest | — |
| *Sanguinaria canadensis* | Bloodroot | native | Infrequent in sand forest | — |
| *Sanicula canadensis* | Canadian Black Snakeroot | native | Occasional in sand forest | — |
| *Sanicula odorata* | Snakeroot | native | Frequent in wet-mesic floodplain forest | — |
| *Saponaria officinalis* | Bouncing Bet | introd. | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Schizachyrium scoparium* | Little Bluestem | native | Abundant in sand prairie and sand savanna | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Scirpus atrovirens* | Dark Green Rush | native | Occasional in wet-mesic floodplain forest | — |
| *Scirpus cyperinus* | Bulrush | native | Infrequent in wet-mesic bottomland forest | — |
| *Scirpus fluviatilis* | River Bulrush | native | Infrequent in wet-mesic floodplain forest | — |
| *Scrophularia lanceolata* | Early Figwort | native | Occasional in sand forest and sand savanna | — |
| *Scutellaria lateriflora* | Mad-dog Skullcap | native | Occasional in wet-mesic bottomland forest | — |
| *Scutellaria ovata* var. *versicolor* | Heart-leaved Skullcap | native | Occasional in sand forest and sand savanna | — |
| *Scutellaria parvula* var. *leonardii* | Small Skullcap | native | Occasional in sand prairie and sand savanna | — |
| *Selaginella rupestris* | Dwarf Spike-moss | native | Frequent in sand prairie and sand savanna | — |
| *Senecio plattensis* | Prairie Groundsel | native | Occasional in sand prairie, sand savanna, and sand forest | — |
| *Setaria faberi* | Nodding Foxtail | introd. | Infrequent in successional field | — |
| *Setaria glauca* | Yellow Foxtail | introd. | Infrequent in developed land and successional field | — |
| *Setaria viridis* | Green Foxtail | introd. | Infrequent in developed land | — |
| *Sicyos angulatus* | Bur-cucumber | native | Frequent in wet-mesic floodplain forest | — |
| *Silene antirrhina* | Sleepy Catchfly | native | Occasional in sand prairie and sand savanna | — |
| *Silene cserei* | Glaucous Campion | introd. | Infrequent in developed land and in sand prairie | — |
| *Silene latifolia* | White Campion | introd. | Occasional in developed land | — |
| *Silene nivea* | Snowy Campion | native | Occasional in wet-mesic floodplain forest | — |
| *Silphium perfoliatum* | Cup-plant | native | Occasional in wer-mesic floodplain forest | — |
| *Sisymbrium altissimum* | Tumble Mustard | introd. | Infrequent in developed land and sand prairie | — |
| *Sisyrinchium campestre* | Prairie Blue-eyed Grass | native | Occasional in sand prairie and sand savanna | — |
| *Smilacina stellata* | Starry False Solomon's Seal | native | Occasional in sand forest | — |
| *Smilax hispida* | Bristly Catbrier | native | Occasional in sand forest and wet-mesic floodplain forest | — |
| *Smilax lasioneuron* | Carrion Flower | native | Occasional in sand forest | — |
| *Solanum carolinense* | Horse Nettle | introd. | Infrequent in sand prairie | — |
| *Solanum cornutum* | Buffalo-burr | introd. | Infrequent in pastureland | — |
| *Solanum ptycanthum* | Black Nightshade | native | Infrequent in sand forest and sand savanna | — |
| *Solidago canadensis* | Common Goldenrod | native | Occasional in successional fields and wet-mesic bottomland forest | — |
| *Solidago gigantea* | Smooth Goldenrod | native | Frequent in wet-mesic bottomland forest | — |
| *Solidago nemoralis* | Field Goldenrod | native | Occasional in sand forest; sand prairie, and sand savanna | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Solidago rigida* | Stiff Goldenrod | native | Infrequent in mesic sand prairie | — |
| *Solidago speciosa* | Showy Goldenrod | native | Occasional in sand prairie | — |
| *Solidago ulmifolia* | Elm-leaved Goldenrod | native | Occasional in sand forest | — |
| *Sorghastrum nutans* | Indian Grass | native | Frequent in sand prairie and occasional in sand prairie | — |
| *Sparganium eurycarpum* | Bur-reed | native | Occasional in open wetland and along edge of Mississippi River | — |
| *Spartina pectinata* | Prairie Cordgrass | native | Rare in sand savanna; occasional along Mississippi River in wet-mesic bottomland forest | — |
| *Spermolepis inermis* | Scaleseed | native? | Occasional in sand prairie and sand savanna | — |
| *Sphenopholis obtusata* var. *major* | Prairie Wedge Grass | native | Occasional in sand forest | — |
| *Sphenopholis obtusata* var. *obtusata* | Prairie Wedge Grass | native | Occasional in sand prairie | — |
| *Spirodela polyrhiza* | Greater Duckweed | native | Frequent on water of ponds and Mississippi river (aquatic) | — |
| *Sporobolus asper* | Tall Dropseed | native | Infrequent in sand prairie and successional field | — |
| *Sporobolus clandestinus* | Rough Dropseed | native | Occasional to frequent in developed land | — |
| *Sporobolus cryptandrus* | Sand Dropseed | native | Abundant in sand prairie and sand savanna | — |
| *Sporobolus vaginiflorus* | Poverty-grass | native | Occasional in developed land and infrequent in sand prairie | — |
| *Stachys hispida* | Hispid Hedge-nettle | native | Infrequent in wet-mesic floodplain forest | — |
| *Stachys tenuifolia* | Smooth Hedge Nettle | native | Infrequent along edge of oxbow lake and in wet-mesic bottomland forest | — |
| *Stipa spartea* | Needlegrass | native | Occasional to frequent in sand prairie and sand savanna | — |
| *Strophostyles helvola* var. *helvola* | Trailing Wild Bean | native | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Strophostyles helvola* var. *missouriensis* | Trailing Wild Bean | native | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Strophostyles leiosperma* | Small Wild Bean | native | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Syringa vulgaris* | Common Lilac | introd. | Infrequent in developed land | — |
| *Talinum rugospermum* | Fameflower | native | Occasional in sand forest, sand prairie, and sand savanna | FFC |
| *Taraxacum officinale* | Dandelion | introd. | Occasional in sand forest and wet-mesic floodplain forest | — |
| *Tephrosia virginiana* | Goat's-rue | native | Occasional in sand forest; Occasional to frequent in sand prairie and sand savanna | — |
| *Teucrium canadense* var. *virginicum* | Germander | native | Occasional along edge of oxbow lake and in wet-mesic bottomland forest | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Thalictrum dasycarpum* | Smooth Meadow Rue | native | Infrequent along oxbow lake and in wet-mesic bottomland forest | — |
| *Thlaspi arvense* | Penny Cress | introd. | Occasional in developed land | — |
| *Tilia americana* | Basswood | native | Infrequent in sand forest | — |
| *Toxicodendron radicans* | Poison Ivy | native | Occasional in sand forest and sand savanna | — |
| *Tradescantia ohiensis* | Spiderwort | native | Occasional in sand forest, sand prairie and sand savanna | — |
| *Tragopogon dubius* | Sand Goat's-beard | introd. | Infrequent in sand prairie | — |
| *Trichostema brachiatum* | False Pennyroyal | native | Occasional in developed land, sand prairie and sand savanna | — |
| *Tridens flavus* | Purpletop | native | Infrequent in developed land, sand prairie, successional fields, and wet-mesic floodplain forest | — |
| *Trifolium arvense* | Rabbit-foot Clover | introd. | Occasional in sand prairie and sand savanna | — |
| *Trifolium campestre* | Low Hop Clover | introd. | Infrequent in developed land | — |
| *Trifolium hybridum* | Alsike Clover | introd. | Occasional in open disturbed wet-mesic floodplain forest | — |
| *Trifolium pratense* | Red Clover | introd. | Occasional in developed land | — |
| *Trifolium repens* | White Clover | introd. | Occasional in developed land | — |
| *Triodanis perfoliata var perfoliata* | Venus'-Looking Glass | native | Occasional in sand forest, sand prairie, and sand savanna | — |
| *Triplasis purpurea* | Sand-grass | native | Occasional in sand prairie and sand savanna | — |
| *Triticum aestivum* | Wheat | introd. | Infrequent in sand prairie | — |
| *Typha latifolia* | Common Cat-tail | native | Infrequent in open disturbed wet-mesic floodplain forest | — |
| *Ulmus americana* | American Elm | native | Occasional in sand forest, sand savanna, sand prairie, and wet-mesic floodplain forest | — |
| *Ulmus pumila* | Siberian Elm | introd. | Infrequent in sand prairie | — |
| *Ulmus rubra* | Slippery Elm | native | Infrequent in sand forest | — |
| *Urtica dioica* | Stinging Nettle | native | Occasional in wet-mesic floodplain forest | — |
| *Vallisneria americana* | Water-celery | native | Occasional aquatic in Mississippi River | — |
| *Verbascum blattaria* | Moth Mullein | introd. | Infrequent in sand prairie and sand savanna | — |
| *Verbascum thapsus* | Woolly Mullein | introd. | Occasional in developed land, sand forest, sand prairie, and sand savanna | — |
| *Verbena bracteata* | Creeping Vervain | native | Occasional in developed land | — |
| *Verbena hastata* | Common Vervain | native | Occasional in wet-mesic floodplain forest | — |
| *Verbena stricta* f. *albiflora* | White Hoary Vervain | native | Rare in sand prairie | — |
| *Verbena stricta* f. *roseiflora* | Pink Hoary Vervain | native | Infrequent in sand prairie | — |
| *Verbena stricta* f. *stricta* | Hoary Vervain | native | Occasional to locally frequent in sand prairie and sand savanna | — |
| *Verbena urticifolia* | Hairy White Vervain | native | Occasional in dry mesic sand forest , sand savanna and wet-mesic bottomald forest | — |

| Scientific Name | Common Name | Native? | Habitat at SAD | E/T |
|---|---|---|---|---|
| *Vernonia fasciculata* | Smooth Ironweed | native | Occasional in wet-mesic floodplain forest | — |
| *Veronica arvensis* | Corn Speedwell | introd. | Occasional in developed land and sand prairie | — |
| *Veronica dillenii* | Speedwell | introd. | Frequent in developed land and occasional in sand prairie | new to IL |
| *Veronica peregrina* | Purslane Speedwell | native | Occasional in developed land | — |
| *Viburnum lentago* | Nannyberrry | native | Occasional in dry upland forest | — |
| *Viburnum opulus* | European Highbush Cranberry | introd. | Rare in sand forest | — |
| *Vicia villosa* | Hairy Vetch | introd. | Occasional in sand prairie | — |
| *Viola pedata* | Bird's-foot Violet | native | Frequent in sand prairie; occasional in dry and sand savanna | — |
| *Viola pranticola* | Common Blue Violet | native | Occasional in wet-mesic floodplain forest | — |
| *Viola pubescens* var. *eriocarpa* | Yellow Violet | native | Occasional in sand forest | — |
| *Viola rafinesquii* | Johnny-jump-up | introd. | Infrequent in dry upland forest | — |
| *Viola sororia* | Woolly Blue Violet | native | Occasional in sand savanna | — |
| *Vitis riparia* | Riverbank Grape | native | Occasional in wet-mesic floodplain forest | — |
| *Vulpia octoflora* | Six-weeks Fescue | native | Abundant in sand prairie and sand savanna | — |
| *Wolffia columbiana* | Water-meal | native | Frequent on water of ponds and Mississippi river (aquatic) | — |
| *Woodsia obtusa* | Blunt-lobed Cliff Fern | native | Infrequent in sand forest | — |
| *Zannichellia palustris* | Horned Pondweed | native | Occasional in open pond | — |
| *Zanthoxylum americanum* | Prickly Ash | native | Frequent in sand forest, sand savanna and occasional in sand prairie | — |

**Appendix 3**. Annotated List of Vascular Plants at the Savanna Army Depot. Arranged by major groups of plants then alphabetically by plant family. This list includes only species we observed during 1996, except for *Polygala verticillata* (Polygalaceae), which was collected in 1993 and *Orobanche fasciculata* (Orobanchaceae), which was last collected at the Depot in 1908 although suitable habitat is still extant. Under "Scientific Names", the authorities are omitted for brevity; they are included on the voucher specimens themselves. Numbers under "Voucher Specimens" refer to collection numbers of L. R. Phillippe, all specimens are deposited in the herbarium of the Illinois Natural History Survey.

| Family | Scientific Name | Voucher Number |
|---|---|---|
| **FERNS AND FERN ALLIES** | | |
| Adiantaceae | *Adiantum pedatum* | 27485 |
| Aspleniaceae | *Asplenium platyneuron* | 27959 |
| Dennstaedtiaceae | *Pteridium aquilinum* | 28006 |
| Dryopteridaceae | *Athyrium filix-femina* var. *angustum* | 27491; 28269; 28582 |
| Dryopteridaceae | *Cystopteris protrusa* | 27794 |
| Dryopteridaceae | *Dryopteris carthusiana* | 27487 |
| Dryopteridaceae | *Onoclea sensibilis* | 28270 |
| Dryopteridaceae | *Woodsia obtusa* | 28578 |
| Equisetaceae | *Equisetum arvense* | 27198 |
| Equisetaceae | *Equisetum hyemale* var. *affine* | 27812; 28426 |
| Equisetaceae | *Equisetum laevigatum* | 27529 |
| Equisetaceae | *Equisetum pratense* | 27195 |
| Equisetaceae | *Equisetum* × *ferrissii* | 28587; 28601 |
| Ophioglossaceae | *Botrychium dissectum* | 28441 |
| Ophioglossaceae | *Botrychium virginianum* | 27483 |
| Ophioglossaceae | *Ophioglossum pusillum* | 28440 |
| Osmundaceae | *Osmunda claytoniana* | 28449 |
| Selaginellaceae | *Selaginella rupestris* | 27158; 27828 |
| **GYMNOSPERMS** | | |
| Cupressaceae | *Juniperus virginiana* | 27503; 28599 |
| Pinaceae | *Pinus banksiana* | 28581 |
| Pinaceae | *Pinus resinosa* | 28446 |
| **FLOWERING PLANTS–MONOCOTS** | | |
| Alismataceae | *Alisma plantago-aquatica* var. *parviflorum* | 27974 |
| Alismataceae | *Sagittaria latifolia* | 28238; 28241 |
| Araceae | *Arisaema dracontium* | 27488 |
| Araceae | *Arisaema triphyllum* | 27201 |
| Commelinaceae | *Commelina erecta* | 27849, 28113 |
| Commelinaceae | *Tradescantia ohiensis* | 27424 |
| Cyperaceae | *Bulbostylis capillaris* | 27832, 27964 |
| Cyperaceae | *Carex annectens* | 27518; 27547; 27751 |
| Cyperaceae | *Carex bicknellii* | 27408 |
| Cyperaceae | *Carex blanda* | 27280 |
| Cyperaceae | *Carex brevior* | 27420 |
| Cyperaceae | *Carex conjuncta* | 27434; 27467 |
| Cyperaceae | *Carex cristatella* | 27810 |
| Cyperaceae | *Carex duriuscula* | 27326 |
| Cyperaceae | *Carex frankii* | 27963 |
| Cyperaceae | *Carex gravida* | 27498 |

| | | |
|---|---|---|
| Cyperaceae | *Carex grayi* | 27453 |
| Cyperaceae | *Carex grisea* | 27452 |
| Cyperaceae | *Carex hirtifolia* | 27472 |
| Cyperaceae | *Carex hystericina* | 27494 |
| Cyperaceae | *Carex laeviconica* | 27796 |
| Cyperaceae | *Carex lupulina* | 27552; 27784 |
| Cyperaceae | *Carex meadii* | 27209 |
| Cyperaceae | *Carex molesta* | 27517 |
| Cyperaceae | *Carex muhlenbergii* | 27425; 27451; 27478 |
| Cyperaceae | *Carex pensylvanica* | 27211; 27308 |
| Cyperaceae | *Carex rosea* | 27437 |
| Cyperaceae | *Carex scoparia* var. *scoparia* | 27438; 27806 |
| Cyperaceae | *Carex stipata* | 27471 |
| Cyperaceae | *Carex stricta* | 27430; 27431 |
| Cyperaceae | *Carex tonsa* | 27159; 27176; 27188; 27192; 27197; 27210; 27212; 27290; 27337; 27772 |
| Cyperaceae | *Carex tribuloides* | 27551; 27982 |
| Cyperaceae | *Carex typhina* | 27792 |
| Cyperaceae | *Carex vulpinoidea* | 27756 |
| Cyperaceae | *Cyperus aristatus* | 28226 |
| Cyperaceae | *Cyperus erythrorhizos* | 28085; 28431 |
| Cyperaceae | *Cyperus esculentus* var. *esculentus* | 28084 28231 |
| Cyperaceae | *Cyperus filiculmis* var. *filiculmis* | 27512; 27773; 27826; 27857 |
| Cyperaceae | *Cyperus filiculmis* var. *macilentus* | 27718; 27774; 27821; 27822; 27856 |
| Cyperaceae | *Cyperus grayioides* | 27829; 27942; 28116 |
| Cyperaceae | *Cyperus odoratus* | 28044 |
| Cyperaceae | *Cyperus schweinitzii* | 27717, 27770, 27820 |
| Cyperaceae | *Eleocharis acicularis* | 27543 |
| Cyperaceae | *Eleocharis erythropoda* | 28120 |
| Cyperaceae | *Eleocharis obtusa* | 27975 |
| Cyperaceae | *Scirpus atrovirens* | 27783; 27983 |
| Cyperaceae | *Scirpus cyperinus* | 27981 |
| Cyperaceae | *Scirpus fluviatilis* | 28569 |
| Hydrocharitaceae | *Elodea nuttallii* | 28242 |
| Hydrocharitaceae | *Vallisneria americana* | 28245; 28262 |
| Iridaceae | *Iris shrevei* | 27800 |
| Iridaceae | *Sisyrinchium campestre* | 27300 |
| Juncaceae | *Juncus interior* | 27782 |
| Juncaceae | *Juncus tenuis* | 27757 |
| Lemnaceae | *Lemna minor* | 28095; 28264-C |
| Lemnaceae | *Spirodela polyrhiza* | 28264-A |
| Lemnaceae | *Wolffia columbiana* | 28264-B |
| Liliaceae | *Allium canadense* | 27788 |
| Liliaceae | *Asparagus officinalis* | 27457 |
| Liliaceae | *Hemerocallis fulva* | 27815 |
| Liliaceae | *Polygonatum biflorum* | 27716 |
| Liliaceae | *Smilacina stellata* | 27166 |
| Najadaceae | *Najas minor* | 27814; 28244 |
| Orchidaceae | *Galearis spectabilis* | 27332 |
| Orchidaceae | *Liparis liliifolia* | 28439 |
| Poaceae | *Agropyron repens* f. *aristatum* | 27947; 27495 |

| | | |
|---|---|---|
| Poaceae | *Agropyron repens* f. *repens* | 27948 |
| Poaceae | *Agropyron smithii* | 27496 |
| Poaceae | *Agropyron subsecundum* | 27949 |
| Poaceae | *Agrostis gigantea* | 27761, 27785 |
| Poaceae | *Agrostis hyemalis* | 27509; 27721 |
| Poaceae | *Alopecurus carolinianus* | 27440 |
| Poaceae | *Andropogon gerardii* | 28108; 28109 |
| Poaceae | *Aristida basiramea* | 28114; 28221; 28222; 28266; 28281; 28421; 28427; 28585; 28604 |
| Poaceae | *Aristida oligantha* | 28112; 28586 |
| Poaceae | *Aristida tuberculosa* | 28028 |
| Poaceae | *Bouteloua curtipendula* | 27864 |
| Poaceae | *Bouteloua gracilis* | 28554 |
| Poaceae | *Bouteloua hirsuta* | 27940; 28224 |
| Poaceae | *Bromus inermis* | 27499 |
| Poaceae | *Bromus kalmii* | 28101 |
| Poaceae | *Bromus racemosus* | 27502 |
| Poaceae | *Bromus tectorum* | 27311 |
| Poaceae | *Calamovilfa longifolia* | 28424 |
| Poaceae | *Cenchrus longispinus* | 27968 |
| Poaceae | *Chloris verticillata* | 27732; 28255 |
| Poaceae | *Cinna arundinacea* | 28433 |
| Poaceae | *Dactylis glomerata* | 27470 |
| Poaceae | *Digitaria sanguinalis* | 27917 |
| Poaceae | *Echinochloa crusgalli* | 27980 |
| Poaceae | *Echinochloa muricata* | 28053 |
| Poaceae | *Elymus canadensis* | 27781; 27920 |
| Poaceae | *Elymus virginicus* | 27998 |
| Poaceae | *Eragrostis cilianensis* | 28213 |
| Poaceae | *Eragrostis hypnoides* | 28044 |
| Poaceae | *Eragrostis pectinacea* | 27836; 27929; 28256 |
| Poaceae | *Eragrostis poaeoides* | 27778; 27928 |
| Poaceae | *Eragrostis spectabilis* | 27742; 28282 |
| Poaceae | *Eragrostis trichoides* | 28284 |
| Poaceae | *Festuca elatior* | 27492 |
| Poaceae | *Festuca obtusa* | 27468 |
| Poaceae | *Festuca ovina* | 27554; 27755; 27855 |
| Poaceae | *Festuca pratensis* | 27410 |
| Poaceae | *Glyceria striata* var. *striata* | 27482 |
| Poaceae | *Hordeum jubatum* | 27548 |
| Poaceae | *Koeleria macrantha* | 27421 |
| Poaceae | *Leersia oryzoides* | 28043 |
| Poaceae | *Leersia virginica* | 28081 |
| Poaceae | *Leptoloma cognatum* | 27916; 28417 |
| Poaceae | *Lolium perenne* | 27513 |
| Poaceae | *Muhlenbergia mexicana* | 28435 |
| Poaceae | *Muhlenbergia racemosa* | 28277; 28420; 28565; 28570 |
| Poaceae | *Muhlenbergia schreberi* | 28434; 28573; 28580 |
| Poaceae | *Panicum capillare var capillare* | 28054; 28416 |
| Poaceae | *Panicum depauperatum* | 27422 |
| Poaceae | *Panicum lanuginosum* var. *fasciculatum* | 27713 |
| Poaceae | *Panicum lanuginosum* var. *implicatum* | 28129 |

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|---|---|---|
| Poaceae | *Panicum linearifolium* | 27527; 27861 |
| Poaceae | *Panicum oligosanthes* | 27423; 27528; 27749 |
| Poaceae | *Panicum villosissimum* | 27414 |
| Poaceae | *Panicum virgatum* | 27986 |
| Poaceae | *Paspalum bushii* | 27859; 27915; 27932 |
| Poaceae | *Paspalum ciliatifolium* | 28066 |
| Poaceae | *Phalaris arundinacea* | 27439 |
| Poaceae | *Poa bulbosa* | 27324 |
| Poaceae | *Poa compressa* | 27419 |
| Poaceae | *Poa palustris* | 27493 |
| Poaceae | *Poa pratensis* | 27307 |
| Poaceae | *Schizachyrium scoparium* | 29425 |
| Poaceae | *Setaria faberi* | 28069; 28087 |
| Poaceae | *Setaria glauca* | 28051 |
| Poaceae | *Setaria viridis* | 27725; 27918 |
| Poaceae | *Sorghastrum nutans* | 28035 |
| Poaceae | *Spartina pectinata* | 27997 |
| Poaceae | *Sphenopholis obtusata* var. *major* | 27486 |
| Poaceae | *Sphenopholis obtusata* var. *obtusata* | 27514; 27519 |
| Poaceae | *Sporobolus asper* | 28418 |
| Poaceae | *Sporobolus clandestinus* | 28223 |
| Poaceae | *Sporobolus cryptandrus* | 27511; 27827; 28063; 28132 |
| Poaceae | *Sporobolus vaginiflorus* | 28212 |
| Poaceae | *Stipa spartea* | 27412 |
| Poaceae | *Tridens flavus* | 28090 |
| Poaceae | *Triplasis purpurea* | 28062; 28216 |
| Poaceae | *Triticum aestivum* | 27764 |
| Poaceae | *Vulpia octoflora* | 27303 |
| Pontederiaceae | *Heteranthera dubia* | 28259-A |
| Potamogetonaceae | *Potamogeton crispus* | 28243 |
| Potamogetonaceae | *Potamogeton nodosus* | 27544; 28257 |
| Potamogetonaceae | *Potamogeton pectinatus* | 28258 |
| Potamogetonaceae | *Potamogeton pusillus* | 28259-B |
| Smilacaceae | *Smilax hispida* | 27426; 27818 |
| Smilacaceae | *Smilax lasioneuron* | 27813 |
| Sparganiaceae | *Sparganium eurycarpum* | 27984; 28261; 28265 |
| Typhaceae | *Typha latifolia* | 28442 |
| Zannichelliaceae | *Zannichellia palustris* | 28590 |

**FLOWERING PLANTS–DICOTS**

| | | |
|---|---|---|
| Acanthaceae | *Ruellia humilis* | 27838 |
| Aceraceae | *Acer negundo* | 27277 |
| Aceraceae | *Acer saccharinum* | 27208 |
| Aceraceae | *Acer saccharum* | 28588 |
| Amaranthaceae | *Amaranthus rudis* | 28235 |
| Amaranthaceae | *Amaranthus spinosus* | 28430 |
| Amaranthaceae | *Amaranthus tuberculatus* | 28432 |
| Amaranthaceae | *Froelichia floridana* var. *campestris* | 27830 |
| Amaranthaceae | *Froelichia gracilis* | 27706; 27927 |
| Anacardiaceae | *Rhus aromatica* var. *arenaria* | 27320 |
| Anacardiaceae | *Rhus aromatica* var. *aromatica* | 27951 |
| Anacardiaceae | *Rhus glabra* | 27334 |
| Anacardiaceae | *Toxicodendron radicans* | 27719 |

| | | |
|---|---|---|
| Apiaceae | *Cicuta maculata* | 27993 |
| Apiaceae | *Conium maculatum* | 27768 |
| Apiaceae | *Cryptotaenia canadensis* | 27786 |
| Apiaceae | *Daucus carota* | 27726 |
| Apiaceae | *Heracleum lanatum* | 27429 |
| Apiaceae | *Osmorhiza claytonii* | 27436 |
| Apiaceae | *Osmorhiza longistylis* | 27435 |
| Apiaceae | *Pastinaca sativa* | 27791 |
| Apiaceae | *Sanicula canadensis* | 27711 |
| Apiaceae | *Sanicula odorata* | 27469 |
| Apiaceae | *Spermolepis inermis* | 27739 |
| Apocynaceae | *Apocynum sibiricum* | 28086 |
| Araliaceae | *Aralia nudicaulis* | 27845 |
| Asclepiadaceae | *Asclepias amplexicaulis* | 27522 |
| Asclepiadaceae | *Asclepias incarnata* | 27988 |
| Asclepiadaceae | *Asclepias syriaca* | 27704 |
| Asclepiadaceae | *Asclepias tuberosa* | 27945 |
| Asclepiadaceae | *Asclepias verticillata* | 27946 |
| Asclepiadaceae | *Asclepias viridiflora* | 27703; 27712 |
| Asteraceae | *Achillea millefolium* | 27507 |
| Asteraceae | *Ambrosia artemisiifolia* | 28070 |
| Asteraceae | *Ambrosia psilostachya* | — |
| Asteraceae | *Ambrosia trifida* | 28092 |
| Asteraceae | *Antennaria neglecta* | 27183, 27853 |
| Asteraceae | *Antennaria plantaginifolia* | 28118 |
| Asteraceae | *Arctium lappa* | 27954 |
| Asteraceae | *Arctium minus* | 28131 |
| Asteraceae | *Artemisia campestris* | 28117 |
| Asteraceae | *Artemisia ludoviciana* | 28286 |
| Asteraceae | *Aster cordifolius* | 28596 |
| Asteraceae | *Aster ericoides* | 28252 |
| Asteraceae | *Aster lanceolatus* | 28232; 28233; 28452 |
| Asteraceae | *Aster lateriflorus* | 28448; 28595 |
| Asteraceae | *Aster linariifolius* | 28568 |
| Asteraceae | *Aster oblongifolius* | 28283 |
| Asteraceae | *Aster ontarionis* | 28234 |
| Asteraceae | *Aster oolentangiensis* | 28423 |
| Asteraceae | *Aster pilosus* | — |
| Asteraceae | *Aster prenanthoides* | 28271 |
| Asteraceae | *Aster puniceus* | 28444 |
| Asteraceae | *Aster sericeus* | 28214 |
| Asteraceae | *Bidens cernua* | 28229; 28447 |
| Asteraceae | *Bidens tripartita* | 28228 |
| Asteraceae | *Bidens vulgata* | 28123 |
| Asteraceae | *Brickellia eupatorioides* | 28218 |
| Asteraceae | *Carduus nutans* | 27541 |
| Asteraceae | *Centaurea maculosa* | 27846 |
| Asteraceae | *Cirsium arvense* | 27777 |
| Asteraceae | *Cirsium discolor* | 28050 |
| Asteraceae | *Cirsium vulgare* | 27943 |
| Asteraceae | *Conyza canadensis* | 28036 |
| Asteraceae | *Coreopsis palmata* | 27715 |
| Asteraceae | *Crepis tectorum* | 27557 |

| | | |
|---|---|---|
| Asteraceae | *Echinacea pallida* | not collected |
| Asteraceae | *Eclipta prostrata* | 28248 |
| Asteraceae | *Erechtites hieracifolia* | 28225 |
| Asteraceae | *Erigeron annuus* | 27497 |
| Asteraceae | *Erigeron philadelphicus* | 27432 |
| Asteraceae | *Erigeron strigosus* | 27520 |
| Asteraceae | *Eupatorium perfoliatum* | 27990 |
| Asteraceae | *Eupatorium purpureum* | 27989; 28125; 28583 |
| Asteraceae | *Eupatorium rugosum* | 27966 |
| Asteraceae | *Eupatorium serotinum* | 27970 |
| Asteraceae | *Gnaphalium obtusifolium* | 28034 |
| Asteraceae | *Grindelia squarrosa* var. *squarrosa* | 28059 |
| Asteraceae | *Helenium autumnale* | 28072 |
| Asteraceae | *Helianthus annuus* | 27720, 27780 |
| Asteraceae | *Helianthus hirsutus* | 28603 |
| Asteraceae | *Helianthus mollis* | 28061 |
| Asteraceae | *Helianthus occidentalis* | 27924 |
| Asteraceae | *Helianthus rigidus* | 28111 |
| Asteraceae | *Helianthus tuberosus* | 28107 |
| Asteraceae | *Heliopsis helianthoides* | 27952 |
| Asteraceae | *Heterotheca camporum* | 27533 |
| Asteraceae | *Hieracium longipilum* | 27935 |
| Asteraceae | *Krigia virginica* | 27177 |
| Asteraceae | *Lactuca canadensis* | 28445 |
| Asteraceae | *Lactuca floridana* | 28103 |
| Asteraceae | *Lactuca serriola* | 28064 |
| Asteraceae | *Liatris aspera* | 28032 |
| Asteraceae | *Matricaria matricarioides* | 27779 |
| Asteraceae | *Ratibida pinnata* | 27987 |
| Asteraceae | *Rudbeckia hirta* | 27730, 27759, 27760 |
| Asteraceae | *Rudbeckia laciniata* | 28106 |
| Asteraceae | *Rudbeckia triloba* | 28105 |
| Asteraceae | *Senecio plattensis* | 27164 |
| Asteraceae | *Silphium perfoliatum* | 28099 |
| Asteraceae | *Solidago canadensis* | 28077 |
| Asteraceae | *Solidago gigantea* | 28080 |
| Asteraceae | *Solidago nemoralis* | 27958; 28268 |
| Asteraceae | *Solidago rigida* | 28217 |
| Asteraceae | *Solidago speciosa* | 28267 |
| Asteraceae | *Solidago ulmifolia* | 28566; 28575 |
| Asteraceae | *Taraxacum officinale* | 27312 |
| Asteraceae | *Tragopogon dubius* | 27411 |
| Asteraceae | *Vernonia fasciculata* | 28073 |
| Balsaminaceae | *Impatiens capensis* | 28037 |
| Balsaminaceae | *Impatiens pallida* | 28005 |
| Berberidaceae | *Berberis thunbergii* | 28001 |
| Berberidaceae | *Podophyllum peltatum* | 27283 |
| Betulaceae | *Betula nigra* | 27161 |
| Betulaceae | *Corylus americana* | 27847 |
| Bignoniaceae | *Catalpa speciosa* | 28121; 28254 |
| Boraginaceae | *Cynoglossum officinale* | 27463 |
| Boraginaceae | *Echium vulgare* | 27500 |
| Boraginaceae | *Hackelia virginiana* | 27919 |

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| Boraginaceae | *Lappula echinata* | 27769 |
| Boraginaceae | *Lithospermum caroliniense* | 27163; 27304 |
| Boraginaceae | *Lithospermum incisum* | 27299 |
| Brassicaceae | *Alliaria petiolata* | 27310 |
| Brassicaceae | *Alyssum alyssoides* | 27289 |
| Brassicaceae | *Arabis canadensis* | 27465 |
| Brassicaceae | *Arabis glabra* | 27343 |
| Brassicaceae | *Arabis lyrata* | 27154 |
| Brassicaceae | *Arabis* × *divaricarpa* | 27556; 27858 |
| Brassicaceae | *Barbarea vulgaris* | 27342 |
| Brassicaceae | *Berteroa incana* | 27449 |
| Brassicaceae | *Brassica nigra* | 27738 |
| Brassicaceae | *Capsella bursa-pastoris* | 27279 |
| Brassicaceae | *Cardamine bulbosa* | 27331 |
| Brassicaceae | *Cardamine hirsuta* | 27433 |
| Brassicaceae | *Cardamine parviflora* var. *arenicola* | 27309 |
| Brassicaceae | *Cardamine pensylvanica* | 28239 |
| Brassicaceae | *Descurainia pinnata* subsp. *brachycarpa* | 27165 |
| Brassicaceae | *Draba nemorosa* var. *leiocarpa* | 27284 |
| Brassicaceae | *Draba reptans* | 27156 |
| Brassicaceae | *Draba verna* | 27191 |
| Brassicaceae | *Erysimum inconspicuum* | 27416; 27555 |
| Brassicaceae | *Lepidium campestre* | 27407 |
| Brassicaceae | *Lepidium densiflorum* | 27409 |
| Brassicaceae | *Lepidium virginicum* | 27302; 27454 |
| Brassicaceae | *Rorippa sessiliflora* | 27450; 28227 |
| Brassicaceae | *Rorippa sylvestris* | 27535 |
| Brassicaceae | *Sisymbrium altissimum* | 27293 |
| Brassicaceae | *Thlaspi arvense* | 27204 |
| Cactaceae | *Opuntia fragilis* | KRR 4267 (collected 19 June 1986); 28065 |
| Cactaceae | *Opuntia macrorhiza* | 27862 |
| Campanulaceae | *Campanula americana* | 27809; 28040 |
| Campanulaceae | *Lobelia cardinalis* | 27999 |
| Campanulaceae | *Lobelia inflata* | 28126 |
| Campanulaceae | *Lobelia siphilitica* | 28091 |
| Campanulaceae | *Triodanis perfoliata var perfoliata* | 27505 |
| Cannabinaceae | *Cannabis sativa* | 27833 |
| Capparidaceae | *Polanisia dodecandra* | 27737 |
| Capparidaceae | *Polanisia jamesii* | 27714; 27722; 27771; 27850; 27936; 27969 |
| Caprifoliaceae | *Lonicera morrowii* | 27295 |
| Caprifoliaceae | *Lonicera tatarica* | 27281 |
| Caprifoliaceae | *Sambucus canadensis* | 27766 |
| Caprifoliaceae | *Viburnum lentago* | 27323 |
| Caprifoliaceae | *Viburnum opulus* | 27428 |
| Caryophyllaceae | *Arenaria serpyllifolia* | 27305 |
| Caryophyllaceae | *Cerastium brachypodum* | 27181 |
| Caryophyllaceae | *Cerastium vulgatum* | 27315; 27753 |
| Caryophyllaceae | *Dianthus armeria* | 27775 |
| Caryophyllaceae | *Holosteum umbellatum* | 27184 |
| Caryophyllaceae | *Myosoton aquaticum* | 27442 |
| Caryophyllaceae | *Paronychia canadensis* | 27831 |

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| Caryophyllaceae | *Paronychia fasitgiata* | 27921 |
| Caryophyllaceae | *Saponaria officinalis* | 27707 |
| Caryophyllaceae | *Silene antirrhina* | 27418 |
| Caryophyllaceae | *Silene cserei* | 27418 |
| Caryophyllaceae | *Silene latifolia* | 27526 |
| Caryophyllaceae | *Silene nivea* | 27787 |
| Celastraceae | *Celastrus scandens* | 27427 |
| Celastraceae | *Euonymus atropurpurea* | 28597 |
| Ceratophyllaceae | *Ceratophyllum demersum* | 28240 |
| Chenopodiaceae | *Chenopodium ambrosioides* | 28048; 28067 |
| Chenopodiaceae | *Chenopodium gigantospermum* | 28275 |
| Chenopodiaceae | *Chenopodium pratericola* | 28049 |
| Chenopodiaceae | *Chenopodium simplex* | 27834, 27848 |
| Chenopodiaceae | *Cycloloma atriplicifolium* | 27736 |
| Chenopodiaceae | *Salsola collina* | 28115; 28253 |
| Cistaceae | *Helianthemum bicknellii* | 27851 |
| Cistaceae | *Helianthemum canadense* | 27456; 28219 |
| Cistaceae | *Hudsonia tomentosa* | 27460; 27763 |
| Cistaceae | *Lechea pulchella* | 27867-B |
| Cistaceae | *Lechea tenuifolia* | 27867-A; 27977 |
| Clusiaceae | *Hypericum perforatum* | 27700 |
| Clusiaceae | *Hypericum punctatum* | 27996 |
| Clusiaceae | *Hypericum sphaerocarpum* | 27797; 27991 |
| Convolvulaceae | *Calystegia sepium* | 27767 |
| Convolvulaceae | *Convolvulus arvensis* | 27852 |
| Cornaceae | *Cornus drummondii* | 27976 |
| Cornaceae | *Cornus racemosa* | 27490; 27537; 28571 |
| Cucurbitaceae | *Sicyos angulatus* | 28088 |
| Elaeagnaceae | *Elaeagnus angustifolia* | 27336 |
| Euphorbiaceae | *Acalypha rhomboidea* | 27741; 28453 |
| Euphorbiaceae | *Chamaesyce geyeri* | 27956 |
| Euphorbiaceae | *Chamaesyce maculata* | 28030 |
| Euphorbiaceae | *Chamaesyce nutans* | 28047 |
| Euphorbiaceae | *Croton glandulosus* var. *septentrionalis* | 27723; 28278 |
| Euphorbiaceae | *Euphorbia corollata* | 27960 |
| Euphorbiaceae | *Euphorbia dentata* | 28052 |
| Euphorbiaceae | *Euphorbia esula* | 27314 |
| Fabaceae | *Amorpha canescens* | 27702 |
| Fabaceae | *Amorpha fruticosa* | 27817 |
| Fabaceae | *Amphicarpa bracteata* | 28038 |
| Fabaceae | *Apios americana* | 28102 |
| Fabaceae | *Chamaecrista fasciculata* | 27934 |
| Fabaceae | *Coronilla varia* | 27524 |
| Fabaceae | *Crotalaria sagittalis* | 27962 |
| Fabaceae | *Desmodium canadense* | 28104 |
| Fabaceae | *Desmodium glutinosum* | 27842 |
| Fabaceae | *Desmodium illinoense* | 27914 |
| Fabaceae | *Gleditsia triacanthos* | 27417 |
| Fabaceae | *Gymnocladus dioicus* | 27805; 28576 |
| Fabaceae | *Kummerowia stipulacea* | 28276 |
| Fabaceae | *Lespedeza capitata* | 28122 |
| Fabaceae | *Lespedeza intermedia* | 28567 |
| Fabaceae | *Medicago lupulina* | 27413 |

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| Fabaceae | *Melilotus alba* | 27501 |
| Fabaceae | *Melilotus officinalis* | 27406 |
| Fabaceae | *Petalostemum purpureum* | 27824 |
| Fabaceae | *Robinia pseudoacacia* | 27444 |
| Fabaceae | *Strophostyles helvola* var. *helvola* | 27933 |
| Fabaceae | *Strophostyles helvola* var. *missouriensis* | 27765 |
| Fabaceae | *Strophostyles leiosperma* | 27925 |
| Fabaceae | *Tephrosia virginiana* | 27728 |
| Fabaceae | *Trifolium arvense* | 27747 |
| Fabaceae | *Trifolium campestre* | 27733 |
| Fabaceae | *Trifolium hybridum* | 28455 |
| Fabaceae | *Trifolium pratense* | 27473 |
| Fabaceae | *Trifolium repens* | 27474 |
| Fabaceae | *Vicia villosa* | 27476 |
| Fagaceae | *Quercus alba* | 28443; 28589 |
| Fagaceae | *Quercus macrocarpa* | 27319 |
| Fagaceae | *Quercus muehlenbergii* | 27475 |
| Fagaceae | *Quercus palustris* | 28094 |
| Fagaceae | *Quercus rubra* | 28042 |
| Fagaceae | *Quercus velutina* | 27187; 28422 |
| Fumariaceae | *Corydalis micrantha* | 27287; 27292 |
| Fumariaceae | *Dicentra cucullaria* | 27203 |
| Geraniaceae | *Geranium carolinianum* | 27553 |
| Geraniaceae | *Geranium maculatum* | 27329 |
| Haloragidaceae | *Myriophyllum spicatum* | 28260 |
| Hydrophyllaceae | *Ellisia nyctelea* | 27278 |
| Hydrophyllaceae | *Hydrophyllum virginianum* | 27338; 28598 |
| Juglandaceae | *Carya cordiformis* | 27466 |
| Juglandaceae | *Carya ovata* | 28119 |
| Juglandaceae | *Carya tomentosa* | 28130 |
| Juglandaceae | *Juglans cinerea* | 28584 |
| Juglandaceae | *Juglans nigra* | 27291 |
| Lamiaceae | *Agastache nepetoides* | 27944 |
| Lamiaceae | *Hedeoma hispida* | 27415; 27727 |
| Lamiaceae | *Leonurus cardiaca* | 27708 |
| Lamiaceae | *Lycopus americanus* | 27955; 28436 |
| Lamiaceae | *Lycopus uniflorus* | 28079; 28450 |
| Lamiaceae | *Mentha arvensis* var. *villosa* | 27992; 28279 |
| Lamiaceae | *Monarda fistulosa* | 27841 |
| Lamiaceae | *Monarda fistulosa* var. *mollis* | 27950 |
| Lamiaceae | *Monarda punctata* | 27931 |
| Lamiaceae | *Nepeta cataria* | 27776 |
| Lamiaceae | *Physostegia virginiana* | 28078 |
| Lamiaceae | *Prunella vulgaris* | 27967 |
| Lamiaceae | *Pycnanthemum virginianum* | 28098 |
| Lamiaceae | *Salvia azurea* subsp. *pitcheri* | 28060; 28279; 28593 |
| Lamiaceae | *Salvia azurea* subsp. *pitcheri* f. *alba* | 28280 |
| Lamiaceae | *Scutellaria lateriflora* | 28075 |
| Lamiaceae | *Scutellaria ovata* var. *versicolor* | 27744 |
| Lamiaceae | *Scutellaria parvula* var. *leonardii* | 27837 |
| Lamiaceae | *Stachys hispida* | 28247 |
| Lamiaceae | *Stachys tenuifolia* | 27799 |
| Lamiaceae | *Teucrium canadense* var. *virginicum* | 27801 |

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| Lamiaceae | *Trichostema brachiatum* | 27941 |
| Linaceae | *Linum sulcatum* | 27823 |
| Lythraceae | *Ammannia coccinea* | 28237 |
| Lythraceae | *Lythrum salicaria* | 28249 |
| Lythraceae | *Rotala ramosior* | 27866 |
| Malvaceae | *Callirhoe triangulata* | 27762; 27994 |
| Malvaceae | *Hibiscus laevis* | 28075 |
| Malvaceae | *Malva neglecta* | 28251 |
| Menispermaceae | *Menispermum canadense* | 27484; 28071 |
| Molluginaceae | *Mollugo verticillatus* | 27705 |
| Moraceae | *Humulus japonicus* | 28285 |
| Moraceae | *Humulus lupulus* | 28124 |
| Moraceae | *Morus alba* | 27285 |
| Nelumbonaceae | *Nelumbo lutea* | 28003 |
| Nyctaginaceae | *Mirabilis hirsuta* | 27793; 27819; 27957; 28000 |
| Nyctaginaceae | *Mirabilis nyctaginea* | 27521; 28419 |
| Nymphaeaceae | *Nymphaea tuberosa* | 28263 |
| Oleaceae | *Fraxinus pennsylvanica* | 27489; 28428 |
| Oleaceae | *Syringa vulgaris* | 27321 |
| Onagraceae | *Circaea lutetiana* subsp. *canadensis* | 27709 |
| Onagraceae | *Epilobium ciliatum* | 28438 |
| Onagraceae | *Gaura longiflora* | 28050; 28437 |
| Onagraceae | *Oenothera biennis* | 28083 |
| Onagraceae | *Oenothera laciniata* | 27926 |
| Onagraceae | *Oenothera rhombipetala* | 27729; 27922 |
| Orobanchaceae | *Orobanche fasciculata* | not seen |
| Oxalidaceae | *Oxalis dillenii* | 27525 |
| Papaveraceae | *Sanguinaria canadensis* | 27193 |
| Plantaginaceae | *Plantago aristata* | 27758 |
| Plantaginaceae | *Plantago lanceolata* | 27735 |
| Plantaginaceae | *Plantago patagonica var brevicarpa* | 27508 |
| Plantaginaceae | *Plantago rugelii* | 27840 |
| Plantaginaceae | *Plantago virginica* | 27448 |
| Polemoniaceae | *Phlox divaricata* subsp. *laphamii* | 27194 |
| Polygalaceae | *Polygala polygama* var. *obtusata* | 27516 |
| Polygalaceae | *Polygala verticillata* | 22291 |
| Polygonaceae | *Polygonatum cespitosum* var. *longisetum* | 28068 |
| Polygonaceae | *Polygonella articulata* | 28220 |
| Polygonaceae | *Polygonum amphibium* | 28230 |
| Polygonaceae | *Polygonum convolvulus* | 27835 |
| Polygonaceae | *Polygonum hydropiper* | 28093; 28429 |
| Polygonaceae | *Polygonum lapathifolium* | 28057 |
| Polygonaceae | *Polygonum pensylvanicum* | 27978; 28058 |
| Polygonaceae | *Polygonum persicaria* | 27979; 28097 |
| Polygonaceae | *Polygonum punctatum* | 28056; 28096 |
| Polygonaceae | *Polygonum ramosissimum* | 28215 |
| Polygonaceae | *Polygonum scandens* | 28128 |
| Polygonaceae | *Polygonum tenue* | 27930; 28029 |
| Polygonaceae | *Polygonum virginianum* | 28039 |
| Polygonaceae | *Rumex acetosella* | 27313 |
| Polygonaceae | *Rumex altissimus* | 27540 |
| Polygonaceae | *Rumex crispus* | 27546 |
| Polygonaceae | *Rumex verticillatus* | 27816 |

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| Portulacaceae | *Claytonia virginica* | 27199 |
| Portulacaceae | *Portulaca oleracea* | 27865 |
| Portulacaceae | *Talinum rugospermum* | 27740, 27868 |
| Primulaceae | *Androsace occidentalis* | 27157 |
| Primulaceae | *Lysimachia ciliata* | 27798 |
| Ranunculaceae | *Anemone canadensis* | 27317 |
| Ranunculaceae | *Anemone caroliniana* | 27155 |
| Ranunculaceae | *Anemone cylindrica* | 27538 |
| Ranunculaceae | *Anemone quinquefolia* | 27202 |
| Ranunculaceae | *Anemone virginiana* | 27790 |
| Ranunculaceae | *Aquilegia canadensis* | 27286 |
| Ranunculaceae | *Caltha palustris* | 27316 |
| Ranunculaceae | *Clematis virginiana* | 28273 |
| Ranunculaceae | *Ranunculus abortivus* | 27168 |
| Ranunculaceae | *Ranunculus fascicularis* | 27301 |
| Ranunculaceae | *Ranunculus hispidus* var. *nitidus* | 27330 |
| Ranunculaceae | *Ranunculus pensylvanicus* | 27972 |
| Ranunculaceae | *Thalictrum dasycarpum* | 27802 |
| Rhamnaceae | *Ceanothus americanus* | 27731 |
| Rhamnaceae | *Ceanothus herbaceus* (*C. ovatus*) | 27458; 27746; 27938 |
| Rhamnaceae | *Rhamnus cathartica* | 27328; 28574 |
| Rosaceae | *Agrimonia gryposepala* | 27965 |
| Rosaceae | *Agrimonia pubescens* | 28002 |
| Rosaceae | *Crataegus calpodendron* | 27985 |
| Rosaceae | *Fragaria virginiana* | 27294 |
| Rosaceae | *Geum canadense* | 27710 |
| Rosaceae | *Geum triflorum* | 27153 |
| Rosaceae | *Malus coronaria* | 27174 |
| Rosaceae | *Malus ioensis* | 27276 |
| Rosaceae | *Malus pumila* | 27205 |
| Rosaceae | *Physocarpus opulifolius* | 28004 |
| Rosaceae | *Potentilla argentea* | 27297 |
| Rosaceae | *Potentilla inclinata* | 27405 |
| Rosaceae | *Potentilla norvegica* | 27754 |
| Rosaceae | *Potentilla recta* | 27504 |
| Rosaceae | *Potentilla simplex* | 28602 |
| Rosaceae | *Prunus americana* | 27162; 27170; 27175 |
| Rosaceae | *Prunus nigra* | 27160 |
| Rosaceae | *Prunus serotina* | 27341 |
| Rosaceae | *Prunus virginiana* | 27296; 28572 |
| Rosaceae | *Rosa carolina* | 27506; 27803 |
| Rosaceae | *Rosa multiflora* | 27545 |
| Rosaceae | *Rosa suffulta* | 28100 |
| Rosaceae | *Rubus allegheniensis* | 27536 |
| Rosaceae | *Rubus argutus* | 27477; 27510; 28027 |
| Rosaceae | *Rubus flagellaris* | 27445 |
| Rosaceae | *Rubus occidentalis* | 27461 |
| Rubiaceae | *Cephalanthus occidentalis* | 27807 |
| Rubiaceae | *Diodia teres* | 27937 |
| Rubiaceae | *Galium aparine* | 27288 |
| Rubiaceae | *Galium circaezans* | 28579 |
| Rubiaceae | *Galium concinnum* | 27843; 28042-B; 28127 |
| Rubiaceae | *Galium triflorum* | 27743; 28454 |

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| Rutaceae | *Ptelea trifoliata* | 27750 |
| Rutaceae | *Zanthoxylum americanum* | 27173 |
| Salicaceae | *Populus deltoides* | 27340 |
| Salicaceae | *Populus grandidentata* | 27333, 27542 |
| Salicaceae | *Populus tremuloides* | 27961 |
| Salicaceae | *Salix amygdaloides* | 27804 |
| Salicaceae | *Salix eriocephala* | 27207 |
| Salicaceae | *Salix exigua* | 27206 |
| Salicaceae | *Salix nigra* | 27318 |
| Santalaceae | *Comandra umbellata* | 27335 |
| Saxifragaceae | *Penthorum sedoides* | 27973 |
| Saxifragaceae | *Ribes missouriense* | 27189 |
| Scrophulariaceae | *Agalinis tenuifolia* | 28451 |
| Scrophulariaceae | *Bacopa rotundifolia* | 27971 |
| Scrophulariaceae | *Besseya bullii* | 27539; 27860 |
| Scrophulariaceae | *Chaenorrhinum minus* | 27854 |
| Scrophulariaceae | *Gratiola neglecta* | 27549 |
| Scrophulariaceae | *Linaria canadensis* | 27178 |
| Scrophulariaceae | *Linaria vulgaris* | 27795 |
| Scrophulariaceae | *Lindernia dubia* var. *dubia* | 28046 |
| Scrophulariaceae | *Mimulus ringens* | 28089 |
| Scrophulariaceae | *Penstemon pallidus* | 27325 |
| Scrophulariaceae | *Scrophularia lanceolata* | 27446 |
| Scrophulariaceae | *Verbascum blattaria* | 27953 |
| Scrophulariaceae | *Verbascum thapsus* | 27995 |
| Scrophulariaceae | *Veronica arvensis* | 27298; 27752 |
| Scrophulariaceae | *Veronica dillenii* | 27180; 27306 |
| Scrophulariaceae | *Veronica peregrina* | 27282 |
| Solanaceae | *Physalis heterophylla* | 27515 |
| Solanaceae | *Physalis longifolia* | 28236 |
| Solanaceae | *Physalis virginiana* | 27459; 27863 |
| Solanaceae | *Solanum carolinense* | 27724 |
| Solanaceae | *Solanum cornutum* | 28031 |
| Solanaceae | *Solanum ptycanthum* | 27745 |
| Tiliaceae | *Tilia americana* | 27443; 27789 |
| Ulmaceae | *Celtis occidentalis* | 27172; 28577 |
| Ulmaceae | *Ulmus americana* | 27167 |
| Ulmaceae | *Ulmus pumila* | 27152 |
| Ulmaceae | *Ulmus rubra* | 27196 |
| Urticaceae | *Boehmeria cylindrica* | 28007 |
| Urticaceae | *Laportea canadensis* | 28082 |
| Urticaceae | *Parietaria pensylvanica* | 27455 |
| Urticaceae | *Pilea pumila* | 28272 |
| Urticaceae | *Urtica dioica* | 27748 |
| Verbenaceae | *Phryma leptostachya* | 27844 |
| Verbenaceae | *Phyla lanceolata* | 27839 |
| Verbenaceae | *Verbena bracteata* | 27734 |
| Verbenaceae | *Verbena hastata* | 28055 |
| Verbenaceae | *Verbena stricta* f. *albiflora* | 27825 |
| Verbenaceae | *Verbena stricta* f. *roseiflora* | 27869 |
| Verbenaceae | *Verbena stricta* f. *stricta* | 27923; 27701 |
| Verbenaceae | *Verbena urticifolia* | 27808 |
| Violaceae | *Viola pedata* | 27186 28600 |

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| Violaceae | *Viola pranticola* | 27327 |
| Violaceae | *Viola pubescens* var. *eriocarpa* | 27339 |
| Violaceae | *Viola rafinesquii* | 27322 |
| Violaceae | *Viola sororia* | 27185; 27200 |
| Vitaceae | *Parthenocissus quinquefolia* | 27939 |
| Vitaceae | *Parthenocissus vitacea* | 27811 |
| Vitaceae | *Vitis riparia* | 27447 |